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Paper TRADE JOURNAL

REG. U. S. PAT. OFF.

VOLUME 124, No. 22 MAY 29, 1947

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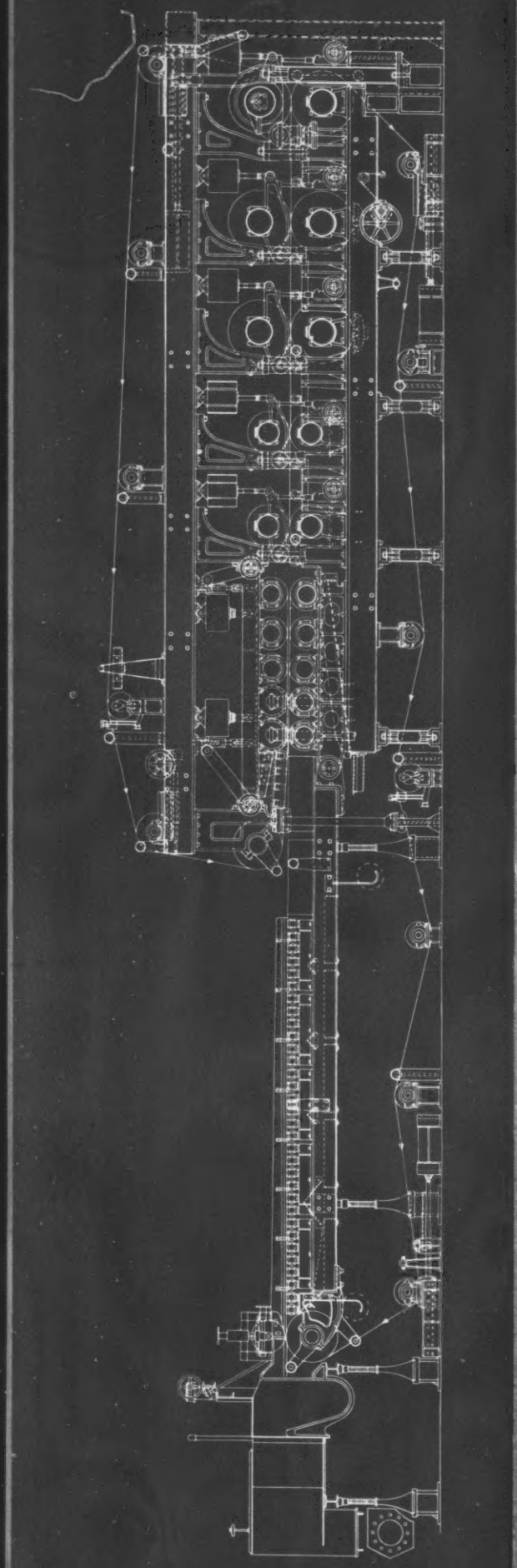
75th ANNIVERSARY



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Paper TRADE JOURNAL

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CALENDAR OF COMING EVENTS

June 11-13, 1947—Canadian Pulp and Paper Association, Technical Section, Summer Meeting. Hotel Algonquin. St. Andrews-by-the-Sea, N. B.

June 13-14, 1947—Maine-New Hampshire TAPPI Section Meeting, Poland Spring, Me.

June 16-17, 1947—American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hotel, Atlantic City, N. J.

June 20-21, 1947—Paper and Twine Association, Annual Meeting, French Lick Springs Hotel, French Lick Springs, Ind.

October 27-29, 1947—The National Paper Trade Association of the U. S., Inc., Semi-annual Convention, Hotel Sherman, Chicago.

May 18-20, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

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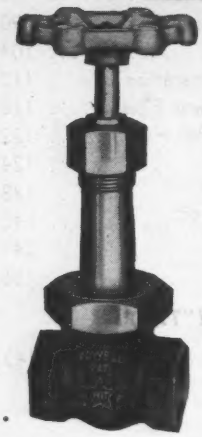
...and served it well



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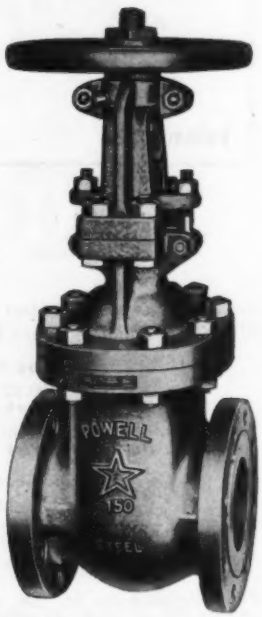

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Paper TRADE JOURNAL
REG U S. PAT. OFF.
VOL. 124, NO. 22 MAY 29, 1947

Institute Closes Its Annual Conference

APPLETON, Wis. — About 220 executives in the paper and allied industries were present at the two-day eleventh conference of the Institute of Paper Chemistry here May 22 and 23. At the closing luncheon Friday, Casper W. Ooms, United States Commissioner of Patents, discussed some of the problems concerning patents in the United States, and raised the question of whether industry can do anything to centralize collection of technical literature from all parts of the world, and to translate and index it. This would avoid the necessity of repeating the work in every plant and industry having need for the material.

He declared that successful operation of the United States patent law in time will depend on ready access to the technical literature of the world.

Ooms also stressed the problems involved in the use of a patent as an embargo and proposals that compulsory licensing be employed to limit the powers of the patentee, and linked them with the field of atomic energy. The atomic energy act forbids patenting of certain inventions in the production of fissionable materials and utilization of such materials in production of military weapons. It also makes any patent necessary to the utilization of atomic energy subject to general licensing.

"This is a novelty in American patent law that was heavily debated in the 79th Congress and is still debated," Ooms said. "The entire question of atomic energy and its adaptation to industrial purposes is so far-reaching and novel in our social experience that any positive conclusions with respect to it must be viewed with diffidence.

"It is an interesting experiment to watch. The frankly experimental character of the entire legislation leads to the assurance that if it appears misdirected in any phase, Congressional correction will follow."

Atomic energy was discussed by Sidney D. Kirkpatrick, New York chemist and editor, who was one of 21 lay observers from 11 nations to view the Bikini bomb explosions last year. He warned that in five to ten years any industrial nation will be able to make enough atomic bombs to destroy all the industrial cities of any other industrial nation, and said that such a race is now going on. He added that there is no military defense against the bombs.

Mr. Kirkpatrick said that Russia has rich resources of uranium and is now working to extract it from low grade sources and is working intensively on atomic power.

"In the atomic race now underway we have no strategic advantage except our huge plants built during the war," he declared.

Official United States Navy pictures of Operation Crossroads, the tests at Bikini, were shown by Dr. A. L. Koch, Appleton.

The visitors were welcomed by Ernst Mahler, Neenah, president of the Institute's board of trustees and executive vice-president of Kimberly-Clark Corporation, Neenah, who also introduced the speakers. Both appeared at North Shore Golf Club.

The conference closed May 23 except for discussion of specific problems of members of the Institute with staff members on Saturday.

Cola Parker on Soo Board

NEENAH, Wis. — Cola G. Parker, president of Kimberly-Clark Corporation, has been reelected director of the Soo Line. The annual meeting was held last week in Minneapolis, Minn.

Superintendents Elect Bennett; Pick New Orleans for 1948

RAYMOND F. BENNETT
Heads A.P.P.M.S.A.

CHICAGO — With the closing, last Saturday, of its swiftly paced, well attended convention the American Pulp and Paper Mill Superintendents Association completed a group of exceedingly busy and fruitful sessions. The convention had got under way on Wednesday with registrations, and with the annual affiliate members dinner. By the time it ended, in a business session on Saturday it had elected Raymond F. Bennett, of the Ecusta Paper Corporation, Pisgah Forest, N. C., its first vice-president, to be president for the coming year. Ollie W. Messner, of the Robertson Paper Box Company, Montville, Conn.; Charles H. Reese, of the Nekoosa-Edwards Paper Company, Port Edwards, Wis.; James Fish, of the Paterson Parchment Paper Company, Bristol, Pa.; Charles E. Ackley, of the Crown Zellerbach Corporation, Port Angeles, Wash., were advanced a step in the vice-presidencies which they had previously held. Glenn Sutton, of the Sutherland Paper Company, Kalamazoo, Mich., was elected fifth vice-president.

The convention, without further delay for later consideration, selected New Orleans as the site for its 1948 convention. Headquarters will be at the Roosevelt Hotel.

Attendance was more than seven hundred.

In his review of the year, presented at the opening session, President Homer Latimer reported:

"The customary term of office of an Association President is one year. In the life of a busy man a year passes quickly and, despite the best of intentions, it sometimes happens that contemplated projects and plans are never executed and frequently forgotten. This results from lack of continuity of thought as one man leaves office and his successor assumes new responsibilities. With this thought in mind there has been created a group known as the Planning Committee, the duty of which is to give advice and counsel to the newly elected officers, both National and Divisional, and assist in carrying prolonged projects and plans through to logical conclusion. It is believed that the formation of this Committee will result in a better function-

ing of Association work, assist our Affiliates in such projects as they may undertake, and further the industry of which we, either directly or indirectly, are a part.

"There was held in Middletown, Ohio, during the past year, a General Maintenance Conference at which time ways and means of maintaining pulp and paper mill equipment were discussed in an informal manner by men who are experts in their respective fields. I was present at this Conference and consider it to have been of great value to those in attendance. It is quite possible that similar conferences will be repeated in the various Divisional areas.

"At at meeting of your directors held at Poland Spring, Maine, in June, 1946, a committee was appointed to revise our constitution. Under date of April 1, 1947, letters were addressed to all members giving notice of and reasons for the proposed revision. These letters were accompanied by copies of the constitutions, both present and tentative. The proposed constitution will be submitted for your approval or rejection during this convention. An enormous amount of work was required in the preparation of the proposed revision. For this I extend my personal thanks to the committee, consisting of Ray Barton, Grover Keeth, and Stanford Blankinship.

"Since the tenure of office of an Association President is of so short duration it may be stated, with slight chance of disagreement, that the Association is only as good as its Secretary. George Craigie, our Secretary-Treasurer, is conscientious in his work and constructive in his thinking. To him I wish to express my personal appreciation."

The annual dinner meeting of the Industrial Affiliate companies of the Superintendents Association was held in the Michigan Room of the Edgewater Beach Hotel on Wednesday night and the following new members were elected to serve as the Industrial Affiliates Committee:

Speakers Table Group at Affiliates Dinner

Walter B. Morehouse, National Oil Products Company, Inc., representing the Chemical Group.

David C. Murchison, Georgia Kaolin Company, representing Non-Fibrous Raw Material Group.

J. H. Loomis, Calco Chemical Division of the American Cyanamid Company, representing the Dyestuff Group.

Leon E. Smith, The Dowington Manufacturing Company, representing the Paper Machine Manufacturers Group.

R. K. Prince, General Machinery Division of Allis-Chalmers, representing the Pulp Mill Machinery Group.

Paul Boronow, Valley Iron Works, representing the Auxiliary Equipment Manufacturers Group.

Frank E. Hutton, Babcock & Wilcox, representing the Power Plant Equipment Group.

John Matthews, Williams Cabble Excelsior Wire Manufacturing Company, representing Wires and Felts Manufacturers Group.

H. F. R. Webber, Link Belt Company, representing the Materials of Construction, Maintenance & Supply Group.

C. D. DeMers, Taylor Instrument, representing the Control Instrument Manufacturers Group.

The new Committee of ten members was nominated by a three-member Nominating Committee in compliance with the Constitution, consisting of Ivar Ekholm, National Aniline Division, Olney Steffens, Penick & Ford, Ltd., and S. W. Fletcher, J. O. Ross Engineering Corporation.

Ralph W. Kumler, American Cyanamid Company, and Chairman of the 1946-47 Committee, acted as Chairman of the dinner meeting and called upon Homer H. Latimer, President, and George Craigie, Secretary of the Superintendents Association, for remarks on the mutual work of the Industrial Affiliates Committee with the officers of the Superintendents Association.

During the last year, it was reported, ten new Industrial Affiliate companies have become associated with the Superintendents Association. The new affiliate companies include the following:

Buffalo Electro-Chemical Corp., Buffalo, N. Y.

George A. Fuller Co., New York, N. Y.

Harris-Seybold Co., Cleveland, Ohio.

Ohio Knife Co., Cincinnati, Ohio.

Perkins-Goodwin Co., New York, N. Y.

Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.

Stowe-Woodward, Inc., Newton Upper Falls, Mass.

Traylor Engineering & Mfg. Co., Allentown, Pa.

(Continued on page 48)

The Annual Industrial Affiliates Dinner

Holyoke Area Mills To Vacation in July

HOLYOKE, Mass.—Industrial activity will be at a low ebb in Holyoke during the first two weeks of July, for vacation shut-downs of most paper mills fall within that period.

Some of the mill vacation periods include the period when the city's three level canals are emptied for the annual inspection and repair of water power installations. This canal shutdown this week will extend from 6 a.m. Friday July 11, to 6 a.m. Monday, July 14.

While most of the industrial establishments have already posted notices of the vacation shutdown, some have not as yet decided the matter definitely. Labor unions have been consulted in many cases in regard to the vacation period.

A survey of the paper mills indicates that the American Writing Paper Corporation's mills and offices both will be shut down for vacation from Sunday, June 29, to Monday, July 14.

The Whiting Paper Company and Whiting and Company mills will all be closed from Thursday, July 3, to Monday, July 14. This period will also apply to the mills of the Franklin Paper Company and the Crocker-McElwain. The Parsons Paper Company's mill and production departments will be closed from June 29 to July 14.

The Chemical Paper Manufacturing Company announced that the mill will be shut down on July 6 for one week. The Carew mill in South Hadley Falls, whose water power is separated from the local canal system, has decided to close for one week starting Sunday, July 27. The Newton and Valley paper companies had not decided on the vacation period at the time of the check-up.

Among the paper processing plants and stationers, the Hazen Paper Co. plans to shut down the week of July 4th. Plans for another week's shutdown, before or after that week, are indefinite. The Marvellum company will be closed the weeks of July 7 to 20. The National Blank Book and White & Wyckoff plants will be closed from July 4 to July 14; the C. F. Church Manufacturing Company shutdown comes the first two weeks in July. The Hampden Glazed vacation period is the first two weeks in July; American Pad & Paper Company from July 4 to 14.

Canada Buys Oil With Newsprint

TORONTO — Canada is expected to conclude a deal with the Argentine whereby 9,000 short tons of Canadian newsprint will be exchanged for about the same number of metric tons of edible oils, to meet the urgent need for fats and oils. The deal is said to be simply an arrangement of convenience and was forced on Canada through the inability of this country to get delivery of its quota of oils.

As for Argentine, the deal follows the same state trading pattern she has been arranging with Sweden and other countries whose products she wants.

Helping Hand

Milwaukee—A chain of 19 Swedish yarn stores last week sent to The Milwaukee Journal an air freight shipment of three pounds of paper pulp sheets to help relieve the newsprint shortage. This was in response to a request by Harold Constant, of a hosiery firm, who went to Sweden recently. He asked that newsprint be sent to the Journal, so that he could get more advertising space.

The newspaper estimated that even if the pulp could be used, which it can't, the gift would be very little help. The paper uses 3,600 tons of newsprint monthly, and the space occupied by the story, not counting the headline, amounted to 100 pounds, for all editions.

Customs Appeals Upholds Higher Exchange Duty

NEW YORK—The United States Court of Customs and Patent Appeals has rendered an important decision on the dutiability of English goods purchased by use of the so-called "free" exchange, holding that such merchandise is dutiable at the exchange value of the official pound sterling and not at the more favorable free exchange rate as claimed by the importers. According to Warren B. Bullock, manager of the Import Committee of the American Paper Industry, this decision was rendered on merchandise other than paper, but the principle will apply to shipments of various British papers imported in the same manner. The cases involving British paper will eventually be decided on the basis of the decision in the test case. The same principle is expected to apply to several shipments of Canadian paper which were carried to the courts in similar pleas by the importers.

Pulp Men to Golf June 3 at Winged Foot

NEW YORK—The annual golf tournament — it's the twenty-fifth of such events — of the New York Pulp Men's Golf Association is to be held June 3, at the Winged Foot Golf Club, Mamaroneck, N. Y. The course is reported to be in excellent shape, and a good turnout is expected by the membership. President Harry W. Draudt (Price and Pierce, Ltd.), Vice-president Roger Eagan (Bulkley Dunton), and Secretary William Flohr (Parsons and Whittemore) have promised that the weather will be fine too.

Waxed-Paper Makers To Meet at Hamilton

CHICAGO—An international meeting of waxed paper manufacturers from the United States and Canada will be held at the annual summer meeting of the Waxed Paper Institute, which is to be held June 12, 13, at Hamilton, Ontario, according to A. H. Noelke, secretary-treasurer of the Institute. Representatives of all waxed paper manufacturers in both countries have been invited to attend the two-day session and exchange ideas on mutual problems and questions. In addition to the regular business session, the two-day meeting will include a sightseeing tour, a trip through a Canadian waxed paper company, and a handicap golf tournament.

Karl R. Zimmer, president of Zimmer Paper Products, Indianapolis, Ind., chairman of the executive committee of the Institute, will preside at the meeting, and will make the opening address. George F. Clark, president of Appleford Paper Products, Ltd., Hamilton, Ontario, Canada, will then officially welcome the United States representatives to Canada.

Hon. Russell T. Kelley, Minister of Health, Province of Ontario, will be the guest speaker at the noon luncheon, June 12, at the Royal Connaught Hotel.

A panel discussion by the Industrial Relations Committee, headed by T. A. Sullivan, H. P. Smith Paper Co., Chicago, Ill., will be one of the highlights of the business meeting. Others who will participate in the forum are Maynard Bartley, Rapinwax Paper Co., Minneapolis, Minn., Robert Huston, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., and G. R. Schenk, Riegel Paper Corporation, New York. Promotional plans for the 1947-1948 fiscal year will be presented by Harold L. Bills, chairman of Merchandising Committee, Saniwax Paper Company, Kalamazoo, Mich.

W. P. Patterson, The Specialty Papers Company, Dayton, Ohio, will make a report on the Statistical Committee activities, and E. P. Gerhardt, Central Waxed Paper Co., Chicago, Ill., will make a report on Traffic Control. George P. Lamb, legal counsel for the Institute, will speak on Sound Trade Association Practice.

Expect Casein Output At 50 Million Pounds

WASHINGTON — Casein production may reach 50,000,000 pounds this year, compared with 18,000,000 in 1946, and 48,000,000 pre-war, the Department of Agriculture announced this week, in an analysis of the dairy outlook.

Pointing to rapid price declines, the department reported that the Argentine price also has dropped, reaching 22 cents on April 11, and that the price of casein probably will not reach 1946 levels during the remainder of 1947.

deVries Off to Europe Fourth Trip This Year

NEW YORK — Marking his fourth such business trip within a period of a little more than one year, Eli de Vries, head of the firm E. de Vries Company, sailed for Europe Tuesday, May 20th, aboard the Holland-America Line steamer "Veendam." The firm represents in Europe the interests of a number of leading American paper mills and an important part of Mr. de Vries' current trip will be to further the introduction and use of these papers.

As is customary, while in Europe, Mr. de Vries will maintain his headquarters in Amsterdam, The Netherlands, with whose paper industry he has been closely identified for over forty years.

Scheduled to visit all important market areas in Western Europe, as well as Scandinavia, it is expected that he will return to the United States in mid-July.

United Paperboard Names Wagner To Head Research

NEW YORK — United Paperboard Company, Inc., has appointed Melvin Wagner to head its newly created Research and Development Division. Mr. Wagner, a holder of numerous patents in the packaging field, will supervise United's program in developing protective packages for foods and other perishable products.

Before joining United Paperboard, Mr. Wagner was co-owner of the Glenside Bag Company, and previous to that he had been on the staff of the Thomas M. Royal Company. He is the inventor of the "Flavor-tainer" bag, a completely hermetically sealed container made of pliofilm and paper, and owns patents on dry lamination methods. He has also had notable success in the designing and building of packaging machinery.

A native of Boston, Mr. Wagner is a chemical engineer, graduated from the Massachusetts Institute of Technology.

Church Council Elects Shattuck as President

MADISON, Wis.—S. F. Shattuck, retired vice-president of Kimberly-Clark Corporation, Neenah, was elected president of the Wisconsin Council of Churches here May 22. The first layman to hold the office, he had been acting president since the late Bishop Schuyler E. Garth of the Methodist church was killed in a plane crash in China last January. Mr. Shattuck is also president of the board of trustees of Carroll College, Waukesha, Wis.

Houser Is Feted On Anniversary

ORANGE, Mass. — Morris Houser, chairman of the Erving Paper Mills, received a bound testimonial and 20 American Beauty roses from his associates in honor of his 20 years at the paper mills.

Houser came to the Erving mills as general manager in 1927 from the American Writing Paper Company in Manchester, Conn., with whom he had been associated for 11 years. Under Houser the Erving plant has expanded and has developed into a leader in the paper napkins industry. Its most recent addition has been the erection of a new oil-burning power plant.

Lang Plays Host to Dexter Management-Labor

DEXTER, N. Y.—Frank J. Lang, general manager of the Dexter Sulphite, Pulp and Paper Company, acted as host to members of the mill management and officials of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, Local 121, at a dinner held in the Brownville Hotel.

Superintendent Robert J. Hackett gave a report of the gains made in production and amount of take home pay since the mill went onto the new bonus plan and also spoke of the new turbine plant now under construction and the two additional digesters to be built soon.

Other members of the management spoke on the future outlook of the mill and plans for several more large improvements.

Floyd C. VanDeusen responded for Local 121 followed by President James Kirch and other members of the committee, who complimented Mr. Lang and his staff on the close friendly relations existing between management and labor in the Dexter Sulphite mill.

Following this meeting the party adjourned to Genes Inn for the evening's entertainment.

West Virginia Directors Elect Merrilees Assistant Secretary

NEW YORK — William L. Merrilees was elected this week to be an assistant secretary of West Virginia Pulp and Paper Company at a meeting of the board of directors in the company offices. For many years Mr. Merrilees has served as head of the company's statistical department. He has been employed by the company since 1908 when he began as an office boy in the company's original New York office.

Powell River Promotes Evans; Cooper and Kyles Move Up

VANCOUVER, B. C.—D. A. Evans has been appointed vice-president in charge of industrial and public relations for the Powell River Company at Powell River, B. C. Russell M. Cooper has been appointed as resident manager at Powell River in succession to Mr. Evans. Mr. Cooper was formerly assistant resident manager and J. A. Kyles, who held a similar post, has been appointed comptroller at the Vancouver offices.

Fred May Elected Rising President

HOUSATONIC, Mass. — Fred E. May, who has been associated with the Rising Paper Company for 18 years, most of the time as a vice-president, has been elected president by the board of directors. He will also serve as general manager. May succeeds the late Richard H. Dempsey. No successor was named to Horace A. Moses, chairman of the board, who died recently.

May went to work for the Strathmore Paper Company in 1907 in the superintendent's office in Woronoco. He became superintendent of that company in 1918. He was in charge of sales promotion in the company's West Springfield office in 1926 and was transferred to Rising Paper as salesman in 1929. He became sales manager in 1930 and was elected first vice-president in 1933.

Box Manufacturers Elect Shaw President

ATLANTIC CITY, N. J.—C. Nowlton Shaw, Jr., of Pawtucket, R. I., this week was elected president of the National Paper Box Manufacturers' Association at its 29th annual meeting.

Shaw succeeded A. M. Bond of Chicago. Other officers elected included Edwin S. Dillard of Chicago, vice-president, and William H. Kreeger, secretary, and Henry J. Aemisegger, treasurer, both of Philadelphia.

Aderhold Switches To Menominee

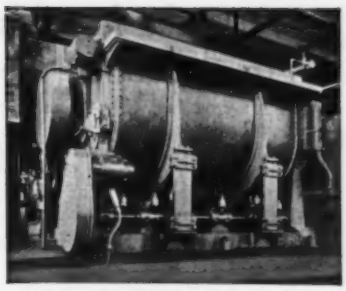
MENASHA, Wis.—Howard Aderhold, past president of the Twin City Safety Council and now its program chairman, will be transferred to the Marathon Corporation mill in Menominee, Mich., in July, it was announced at the council meeting last week. Seventy-five foremen and supervisors attended the May meeting at which two safety films were shown.

Sensenbrenner Again Heads Wisconsin Regents Board

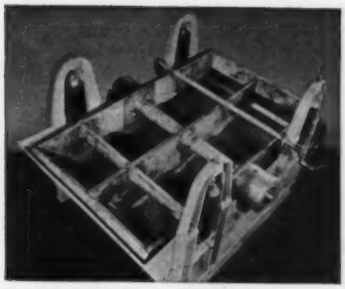
MADISON, Wis. — Frank J. Sensenbrenner, former chairman of the board of Kimberly-Clark Corporation, Neenah, was reelected May 23 as president of the University of Wisconsin Board of Regents. He was first elected to the position a year ago. Mr. Sensenbrenner is 81.

Sales and Ad Clubs Elect Abbey President

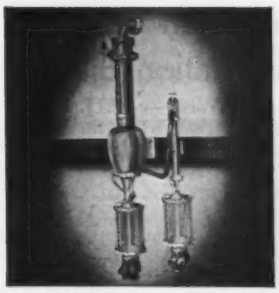
BUFFALO, N. Y. — Carl D. Abbey, vice-president and sales manager of the fine paper division of the Hubbs & Howe Co., has been elected president of the International Affiliation of Sales and Advertising Clubs.



1. The BIRD SCREEN handles better than 80% of all the paper made in North America. Essential for continuous, high speed production of uniformly good paper.



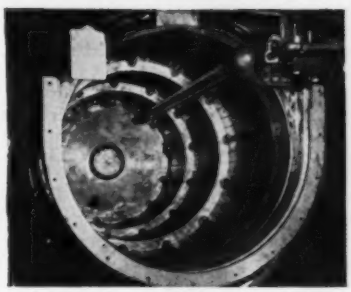
2. The JONSSON SCREEN has proved the ideal knotter for all kinds of pulp and for brown stock ahead of washers; the Screen for straw and waste paper stocks, too.



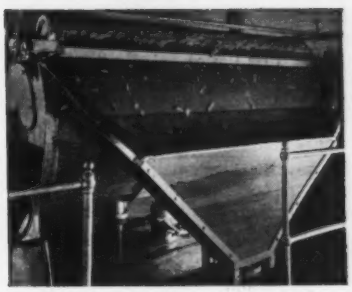
3. The BIRD DIRTEC is the most effective means of removing dirt ahead of the paper machine by the low cost pressure-drop principle; ideal for handling screen tailings also.

SUPERINTENDENTS NUMBER

4. The BIRD CENTRIFINER produces cleanest paper of fine grades and specialties by triple centrifugal treatment.

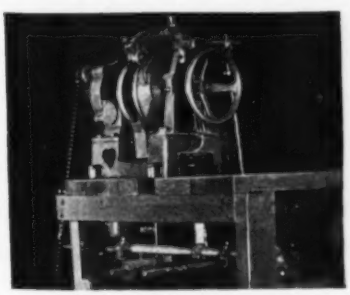


5. The BIRD OSCILLATING SHOWER PIPE keeps screen plates and cylinder molds clean with minimum shower water. Pays for itself out of the savings in water, fibre and heat.

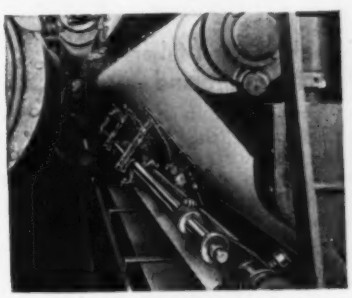


6. The BIRD SAVE-ALL recovers good papermaking fibres from paper machine waste water at lowest net cost per pound.

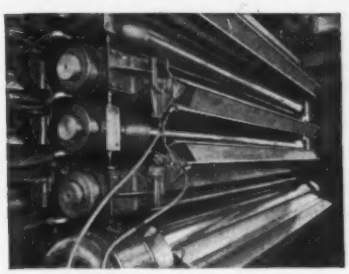
Nine ways to make better pulp and paper and more of it at lower cost per ton



7. The BIRD CONSISTENCY REGULATOR holds pulp and paper stock consistency to not more than 0.1% heavier or lighter than desired; thoroughly dependable, trouble-free.



8. The VICKERY FELT CONDITIONER keeps press felts continuously clean and absorbent without midweek shutdowns.



9. VICKERY DOCTORS keep all papermaking roll surfaces in shape to do their best work at all times.

For descriptive bulletins, recommendations, layouts and estimates on any or all nine items of Bird Machinery, get in touch with

BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

Paper Men Support Conservation Bill

MADISON, Wis. — W. J. Brown, of Kimberly-Clark Corporation's forestry department, Neenah, and Robert C. Dosen, of the Nekoosa-Edwards Paper Company, Port Edwards, supported the endorsement by F. G. Wilson, Wisconsin Conservation Department forester, of the bill providing state regulation of timber-cutting, when they appeared last week at a hearing before the Senate judiciary committee. Wilson said that the present Wisconsin timber situation was "like a depleted bank account."

"We can either build the forests up again or close them out," he said. "Some restriction on the cutting of young timber is necessary. There has been criticism of the bill because it is supported by the paper industry. But is there anything wrong with the second largest industry in the state seeking legislation? The entire welfare of the Fox River Valley depends on an adequate supply of pulpwood."

He said that, according to the United States Forest Service, 75 percent of the timber cutting in Wisconsin was in immature stands. He praised the paper mills for their reforestation projects.

Brown said that public control of the cutting will insure continued prosperity and existence of the industry in the Fox River Valley. He added that he prefers state to federal regulation, but suggested that federal control will follow failure of the states to take on regulatory responsibility.

"The mills of the Fox River Valley are all dependent on wood for their very existence. If the supply is cut off, what would happen to them?" This bill is a step in the direction of maintaining a forest cover and building up a forest stock."

The bill excludes farmers whose wood lots are "an integral part of the farm," but farmers voiced opposition at the hearing, saying they were "scared of the conservation department" and seeing the bill as an entering wedge to regulation. They proposed a program of education and research instead of the regulatory measure.

Several lumbermen also expressed opposition. They asserted that the restrictions imposed would force them to cut lumber that had no market value.

Wisconsin Houses First Experimental Forest

RHINELANDER, Wis. — An 8,194-acre tract in Forest County has been established as Wisconsin's first federal experimental forest. It is situated in Nicolet National Forest and has been named "Argonne Experimental Forest," as a "living memorial" to American soldiers who died in the French forest of the same name in World War I.

The forest contains 8,000,000 board feet of saw timber, 15,000 cords of pulpwood and 18,000 cords of fuelwood. Major types include second growth norther hardwoods, balsam fir, aspen, paper birch, black spruce and white cedar, according to J. H. Stoeckeler, in charge of the northern Wisconsin forest research center.

Mr. Stoeckeler said special emphasis would be placed on studies involving improvement and sanitation cuttings, commercial thinnings, pruning tests and care of forest plantations to improve quantity and quality of tree growth. He expected the results to be useful especially to pulp and paper companies, sawmills and foresters.

Forest Products Lab. May Have to Curtail

MADISON, Wis. — About 150 of the 450 employes at the U. S. Forest Products Laboratory here were to receive dismissal notices May 28 because of a House appropriations subcommittee's budget recommendation, according to George M. Hunt, laboratory director.

He said that the recommendation that Congress cut the laboratory's budget from $1,555,000 to $1,000,000 for the next fiscal year came at a time when the laboratory was engaged in carrying out research on scarce building materials. The dismissal notices comply with regulations, but it was not known how Congress would act on the recommendation. If Congress rejects the recommendation, the notices will be withdrawn and the employes rehired if possible.

The laboratory had requested $182,164 for experimenting with new processes in making pulp and paper; $264,690 for wood chemistry projects; $449,121 for research in conditioning and protection of wood products; $659,025 for development of new products.

French Paper Makers Visit New England

WEST SPRINGFIELD, Mass. — Representatives of the local Chamber of Commerce were on hand to greet a small group of paper makers from France when they arrived here recently.

They were escorted to the Strathmore Paper Company mill for an inspection as part of the tour of American paper mills.

The French paper makers, Adolph Halard, Roger DeVouge, Rene Sibille, E. de Guillebon, Pierre Martin and Pierre Mortel, are chiefly interested in inspecting methods of manufacture.

Celanese Party Inspects Site

VANCOUVER, B. C.—Harold Blancke, New York, president of the Celanese Corporation of America and other senior officials of the company are due to arrive in Prince Rupert in the latter part of May to inspect the site recently acquired at Port Edward for the erection of a new celanese plant, estimated to cost approximately $15,000,000.

G.P.O. Asks for Bids On Third Quarter Needs

WASHINGTON, D. C. — Sealed proposals will be received until 10 a.m., June 16, 1947, in the room of the Joint Committee on Printing, in the Capitol, for furnishing the paper for the public printing and binding, and blank paper for the use of the Government departments and establishments in the District of Columbia, for the term of three months, beginning July 1, 1947; deliveries to be f.o.b. Government Printing Office Warehouse, or warehouse siding, Washington, D. C. The proposals will be opened in the presence of and the award of contracts made by the Joint Committee on Printing to the lowest and best bidders for the interest of the Government whose bids are in conformity with the requirements of the proposal. The Committee reserves the right to reject any or all bids, or to accept any bid or any part and reject the other part, if, in its opinion, such action would be in the interest of the Government.

Blank proposals containing the instructions, schedule, and specifications, accompanied by standard samples, may be obtained by addressing A. E. Giegengack, Public Printer, Washington 25, D. C.

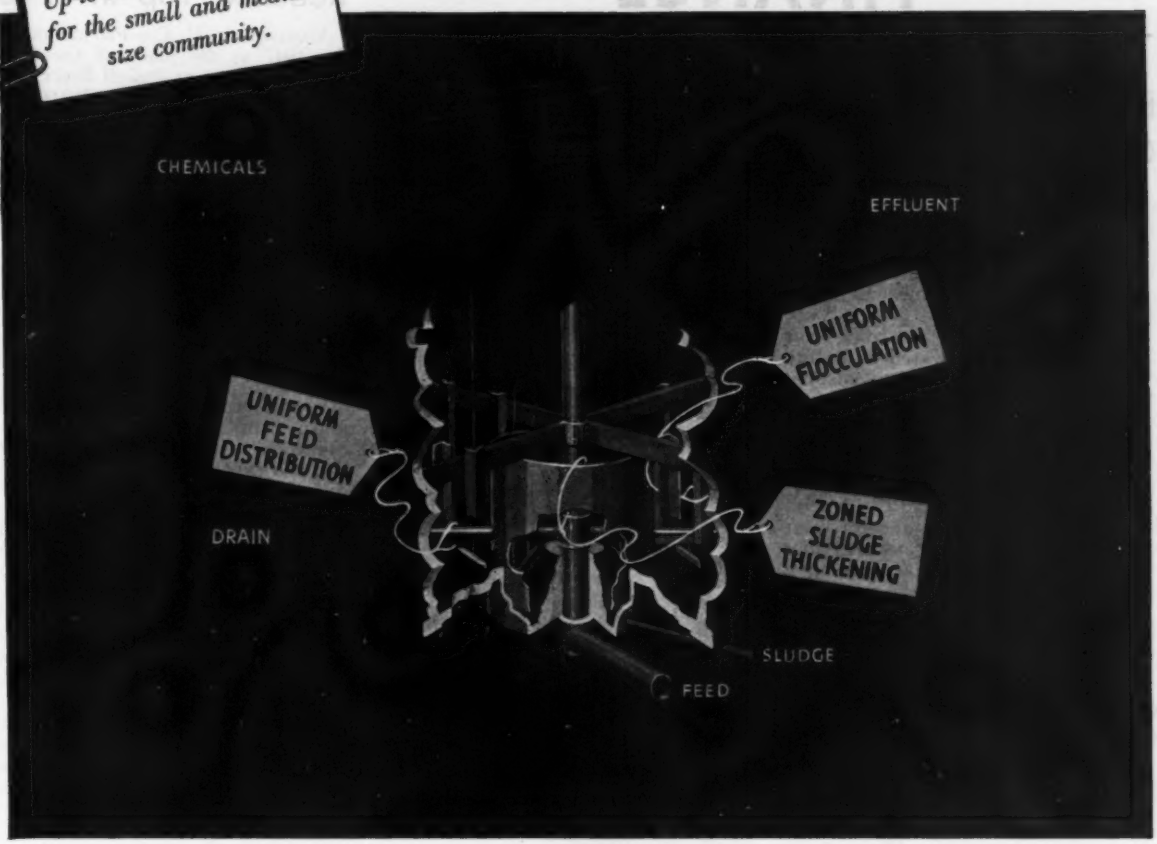
Contracts will be entered into for supplying the quantities required, whether more or less than the estimates, as provided in paragraph 15 of the instructions.

The approximate estimated quantities set forth in detail in the schedule comprise:

200,000	pounds newsprint paper.
950,000	pounds machine-finish book paper.
100,000	pounds English-finish book paper.
40,000	pounds machine-finish book end paper.
500,000	pounds offset book paper.
40,000	pounds offset poster paper.
50,000	pounds antique book paper.
200,000	pounds supercalendered book paper.
1,050,000	pounds coated book paper.
40,000	pounds mimeograph paper.
40,000	pounds duplicator copy paper.
500,000	pounds U S M O safety writing paper.
8,650,000	pounds writing paper.
150,000	pounds map paper.
130,000	pounds manifold paper.
865,000	pounds bond paper.
340,000	pounds ledger paper.
500,000	pounds index paper.
80,000	pounds manila paper.
170,000	pounds kraft paper.
200,000	sheets white gummed paper.
5,000	pounds high-finish red sulphite paper.
10,000	sheets railroad board.
40,000	pounds wood cardboard.
50,000	pounds chemical wood tan board.
5,150,000	pounds postal card paper.
200,000	pounds newsboard.

Up-to-date water treatment for the small and medium size community.

The DORRCO HYDRO-TREATOR



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COMBINING Flocculation, Sludge Thickening and Clarification in a single, compact unit, the Dorrco Hydro-Treator provides effective water treatment . . . at minimum cost.

Why effective treatment with the Hydro-Treator? Because the raw water is distributed throughout the entire flocculation zone evenly and without disturbance. Because the graduated paddle mechanism maintains uniform flocculation conditions. Because zoned sludge thickening promotes maximum density of settled solids.

Why low cost treatment with the Hydro-Treator? Because all three treatment steps are accomplished in a single space-saving unit in which maximum tank area and volume are effectively utilized. Because the mechanism design promotes fast chemical reaction . . . yet prevents interference among the three treatment zones.

Available in sizes ranging from 10 to 100 feet in diameter, the Dorrco Hydro-Treator will handle softening, turbidity or color removal effectively . . . and with economy. A Dorr engineer will gladly supply more detailed information.

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DORR

RESEARCH — ENGINEERING — EQUIPMENT

FINANCE

Eagle A Reports Quarter Earnings

HOLYOKE, Mass.—In a statement to stockholders, the American Writing Paper Corp. has reported that net profit for the first three months of 1947, after all expenses including estimated federal taxes on income, totaled $179,925.78.

It was pointed out that results for the first quarter of 1947 reflect the full benefit of recent price adjustments, but do not contain the entire impact of all known cost increase to date nor the announced pulp cost increases effective April 1 at an estimated annual rate of $140,000.

Because of this fact and the general business uncertainties, the statement continued, it cannot be assumed that the first quarter earnings are indicative of the 1947 annual trend.

For the corresponding period in 1946, the net profit was $24,474.83, after deducting all expenses including estimated federal taxes on income.

Glatfelter Finances Cost Of Mill Improvements

SPRING GROVE, Pa.—P. H. Glatfelter Company has authorized sale of 6,243 shares of 5 percent cumulative first preferred stock, $100 par. These shares will be sold as part of a program to raise funds for improvements. The company also plans to sell privately at a later date $3 million of new first mortgage 3½ percent sinking fund bonds and 40,000 common shares, $10 par, at $12.50 a share. The company plans to split its common stock on a 10-for-1 basis and increase the authorized amount from the 11,000 no par shares now outstanding to 300,000 shares, $10 par. Following the split there will be 110,000 shares outstanding.

Alien Property Office Lists Eight Container Patents

WASHINGTON, D. C.—Attorney General Tom C. Clark has authorized that a group of eight patents relating to paper containers seized from an enemy national have just been made available for licensing. Mr. Clark said the patents can be licensed by American business on a royalty-free, non-exclusive basis for an administrative fee of $15 per patent.

Donald C. Cook, Director of the Office of Alien Property, explained that one of the patents—No. 2,248,535—covers a unique process and apparatus for the manufacture of a paper carton.

Mr. Cook said this container has a folding closure and is saturated with paraffin or some similar substance for stiffening. During the manufacture of this carton, he said, the creases of the closure are set so that the shape of the container is not disturbed when it is closed. Mr. Cook added that it was possible to nest this type of carton for shipping.

Powell River Output Reached Top in 1946

VANCOUVER, B. C.—Production during 1947 at the plant of the Powell River Company at Powell River, B. C., was up to schedule with 240,000 tons of newsprint, according to Harold S. Foley, president of the company. This is 13,500 tons more than the all-time record established in 1946.

Sulphite pulp production objective for the company for 1947 is 40,000 tons more, Mr. Foley said, compared with 33,233 tons last year. He pointed out that the current $90 per ton gross price for newsprint, when freight was deducted represented an average of $12.50 a ton on the company's entire output.

Regarding dividend policy, Mr. Foley said: "Until such time as we have completed and paid for the modernization and expansion program now under way, directors plan to disburse in dividends an amount approximating 60 percent of the net earnings after income taxes in the year in which they are earned. To accomplish this, it is planned to establish and maintain a sound, basic quarterly dividend, well within the company's earning power, and when warranted, pay extra dividends in June and December to equalize the 60 percent of net earnings.

"The year 1946, we believe, was the most successful in our company's history," Mr. Foley said to the meeting. "Over-all production of our plant reached an all-time high, our reserves of standing timber were increased, and our financial position at the close of the year was in a very strong and sound position."

Mr. Foley said it had been very en-

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending May 24, 1947

STOCKS

	High	Low	Last
A. P. W.	4⅜	4⅛	4¼
Armstrong Cork Co.	41½	38⅜	40⅜
Armstrong Cork Co., pf.	104	103	104
Celotex Corp.	22¼	19⅞	21⅞
Celotex Corp., pf.	20½	20¼	20¼
Certain-Teed Products Corp.	13½	11⅝	13⅜
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	20½	19¼	19⅞
Champion Paper & Fibre Co., pf.	109	108	108
Congoleum Nairn Co.	25	23½	24⅜
Container Corp. of America	34¾	32¼	34¾
Crown Zellerbach Co.	26⅛	25⅛	25¾
Crown Zellerbach Co., pf., 4.20	103	102½	102½
Crown Zellerbach Co., 4 pf. 4	107½	105½	107½
Dixie Cup Co.	26½	25	26¼
Dixie Cup Co. A	50	49	50
Flintkote Co.	26⅝	24	26½
Flintkote Co., pf.	106¾	105	106¾
Robert Gair	6⅜	5¾	6⅛
Robert Gair, pf.	20⅛	19½	20⅛
International Paper Co.	41⅝	38¾	41½
International Paper Co., pf.	102	101½	102
Johns Manville Corp.	111½	107	111½
Johns Manville Corp., pf.	110½	109½	110½
Kimberly-Clark Corp.	24⅝	22⅜	24⅝
Kimberly-Clark Corp., pf.	107	104½	107
Mac Andrews & Forbes	35½	35½	35½
Mac Andrews & Forbes, pf.	....	....	....
Marathon Corp.	20⅞	20⅛	20⅞
Mead Corp.	17¾	16½	17¾
Mead Corp., pf. 4¼	94	94	94
Mead Corp., pf., 2	....	....	....
National Container Corp.	36⅜	33	35¾
Paraffine Companies, Inc.	60	59	60
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	19⅞	17¾	19½
Rayonier, Inc., pf.	37	36¾	36¾
Ruberoid Co.	44½	42½	44
Scott Paper Co.	43¾	43½	43¾
Scott Paper Co., pf.	98½	98¼	98½
Sutherland Paper Co.	36⅝	36	36½
Union Bag & Paper Corp.	28¾	25½	28¼
United Paperboard Co.	15	13⅞	14¾
U. S. Gypsum Co.	91½	86	91
U. S. Gypsum Co., pf.	195¾	195¾	195¾
West Virginia Pulp & Paper Co.	36	32½	36
West Virginia Pulp & Paper Co., pf.	112¼	110¾	110¾

BONDS

Abitibi Pulp & Paper Co., 5s '53	....	....	....
Celotex Corp., 3¼s '60	104	103⅛	103½
Certain-Teed Products Corp., 5½s, '53	....	....	....
Champion Paper & Fibre Co., 3s '65	....	....	....
Mead Corp., 3s '66	....	....	....

New York Curb Exchange

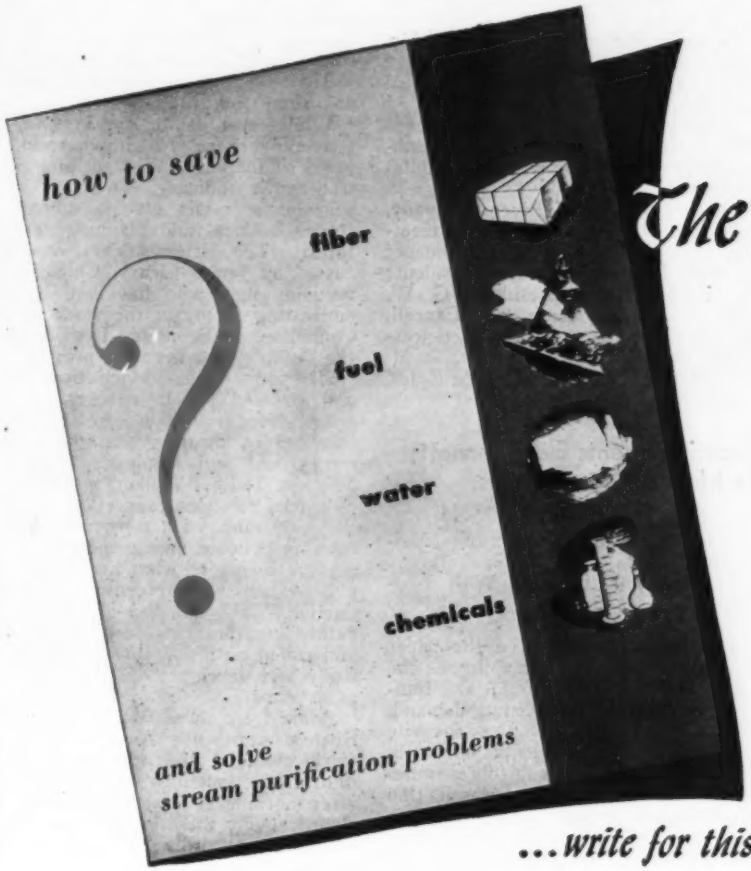
High, Low and Last for Week Ending May 24, 1947

STOCKS

	High	Low	Last
Great Northern Paper Co.	41½	40	41½
Hummel Ross Fibre Corp.	....	....	....
St. Regis Paper Co.	8¼	7½	8
Taggart Corp.	9	8¾	9

BONDS

American Writing Paper Co., 6s, '61	....	....	....



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SVEEN PEDERSEN FLOTATION SAVEALL will solve many of your problems effectively and economically. While recovering more fibers and fillers than the conventional type savealls, Sveen Pedersen clarifies the water to such a degree that it can be extensively re-used in the system. This not only means considerable savings in fresh water and fuel consumption, but also provides a solution to stream improvement problems. Sveen Pedersen's other important advantages are: low maintenance cost; ease of cleaning; rapid circulation through the system; high efficiency on heavily loaded stock; and insensitivity to ordinary fluctuation in white water flow. Write for descriptive brochure.

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couraging to top management to note the interest shown by superintendents and foremen in monthly meetings at which operating problems and company policies were frankly discussed.

With the rehabilitation program complete, the company has 588 veterans of War II and 200 of War I.

On the question of newsprint supply, Mr. Foley said the company had come in for considerable unjustified criticism in the newspapers regarding treatment of Canadian publishers. He told shareholders the company in 1946 allocated 13 percent of its total production to Canadian publishers, which was almost double the average supplied by the whole Canadian newsprint industry.

In a reference to the newsprint price controversy, he pointed out that, due to the world shortage, fantastic prices were offered. The company, however, had concentrated its tonnage in markets where the f.o.b. mill was not so high.

R. Bell-Irving, first vice-president, said that the hydraulic barker for big logs, recently placed in operation, is now barking well over 90 percent of all wood used. Wood consumption per ton has, in consequence, already dropped by about six percent. The hydraulic barker for small logs should be completed in the next few weeks and the log chipper shortly after. Sulphite mill changes are expected to result in a saving of over 5,000,000 feet of logs per annum.

Vice-president B. R. Cancell, in a review of production and markets, said no price change in Powell River newsprint is likely during 1947, although foreign newsprint is being sold at prices in many cases double, or more than double, the company's.

Dealing with the logging and timber department, Vice-president G. W. O'Brien told how wood was conserved when the loggers' strike cut into the company's log reserves. Total log consumption in 1946 was 163,000,000 million feet. The lumber cut was reduced to 11,250,000 in 1945. Estimated log consumption for 1947 is 175,000,000 feet.

An operating logging company was acquired last year, bringing to four the wholly-owned logging subsidiaries. Their combined log output in 1946 was 74,000,000 feet. Remainder of log purchases came from contractors and independent producers.

Logging in 1946 depleted company timber reserves by 137,000,000 feet but 378,000,000 feet was purchased, making a net increase of 241,000,000 feet. Timber properties under option at end of 1946 have been taken up since. Total timber reserves held under various types of forest tenure and cutting contracts now amount to about 6¼ billion feet. As part of the company's conservation program, a plan for utilizing cordwood has been introduced and it is proposed to develop a considerable supply of wood from this source in the future.

Mr. O'Brien said the new British Columbia Forest Act, giving the operator the privilege of carrying out his own forest protection work, will be a distinct benefit to Powell River Company because its holdings are largely located in areas where the fire risk is not great. As a result, the company expects to carry out a much more extensive forest protection program than in the past.

In reviewing operating results, Mr. Evans said the average daily output of the paper machines set a new record at 745 tons.

Mr. Kyles reviewed the 1946 financial statement, touching on the substantially improved working capital position.

Officers of Powell River Company, following changes made at the meeting, are: Harold S. Foley, president; R. Bell-Irving, first vice-president; G. F. Laing, vice-president; G. W. O'Brien, vice-president; B. R. Cancell, vice-president; D. A. Evans, vice-president; J. H. Lawson, secretary; R. M. Cooper, resident manager; J. A. Kyles, comptroller.

Superintendents Elect Bennett; To Meet at New Orleans

(Continued from page 40)

Velocity Steam Production Engineering, Chicago, Ill.

Virginia Smelting Co., West Norfolk, Va.

Speaker after speaker stressed the confidence all branches of the paper trade were placing in the ability of the paper and pulp mills to fill the hungry maw of an ever widening demand.

While production was a favorite topic, the superintendents obviously had two other major subjects in mind as the discussions led to new scientific developments which would improve quality as well as quantity and to ways and means of reducing wastes and improving procedure to partially overcome the rapidly increasing costs of production.

New scientific developments which were perfected during the war time were repeatedly reported by men who were bursting with enthusiasm over the potentialities of these evolutions in paper and pulp making.

GEORGE W. CRAIGIE
Directs Successful A.P.P.M.S.A. Meeting

One of the programs of the first day's session, a panel on "Stock Preparation," showed as much as anything else the concentration necessary in solving mechanical problems where waste and time consumption were a disturbing factor.

While most of the speakers at the convention were men drawn from the ranks of the pulp and paper and allied trades, the audience also heard some splendid addresses on the subject of future business and planning for the future. The latter subject was discussed by James Cleary, Chicago advertising man who has long been a motivating factor in the work of the Committee of Economic Development. He outlined the over all program of CED, pointed out its practical value and stressed the importance of full cooperation from the pulp and paper industry in insuring continued high wages and full employment in this country. DeLoss Walker, inspirational industrial relations counsellor, outlined the importance of a constructive relationship between management and employees to insure what he termed the greatest need of the century — "production." He called it the "key" to future of America's economic system and called on his audince to carefully study and develop industrial relations as a "must."

Aside from these two speakers, the Superintendents Association stuck fairly close to trade matters, dividing into group meetings each afternoon after morning general conferences. Included among these groups were those who gathered to discuss tissues, coated papers, fine papers, woodroom and woods operations, board kraft, chemical pulp problems and power and plant engineering technicalities.

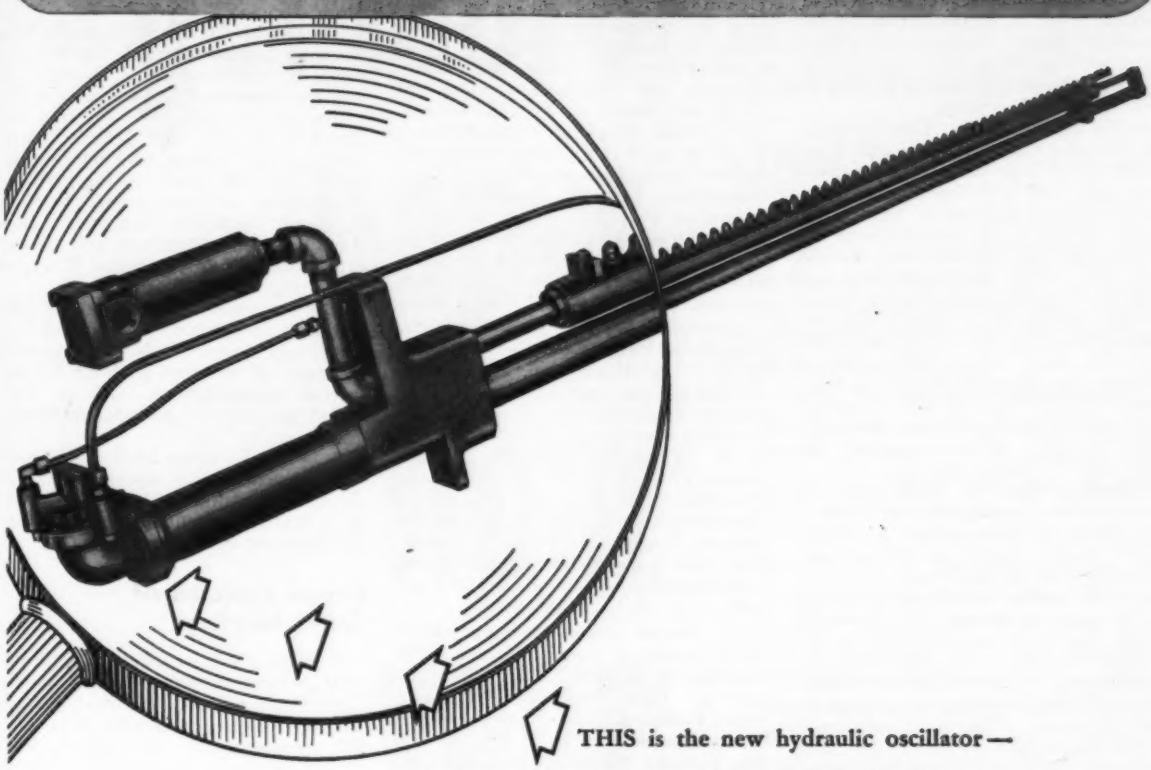
Among the subjects listed for specific discussion, and the speakers handling these topics, were the following:

"Waste in White Water," Fred Clark of Frederick C. Clark Associates and Arthur Thurn, Champion Paper & Fibre Company; Reuben Robertson, Jr., executive vice-president, Champion Paper & Fibre Company; "High Density Pulping and Pumping," Tany Agronin, Black-Clawson Company; "Single Rotation Refiner," Lyon L. Sutherland, Sutherland Refiner Corporation.

Group meeting speakers for the Chemical Pulp sessions which covered the subject of "Preparation and Treatment of Pulp After Booking," were R. K. Prince, Allis-Chalmers Manufacturing Company, who served as moderator; E. F. Tucker, Stebbins Engineering; Douglas Robbins, Douglas Robbins & Co., and J. Schenk, Magnus Metal Corporation.

The Power and Plant Engineers section split up into an electrical section, a power plant section and a paper machine section where H. M. Spring,

THE BROUGHTON S-13-H SHOWER is now *Hydraulically Oscillated*



THIS is the new hydraulic oscillator—built-in, automatic, dependable. Driven by the same water that passes through the shower, all electrical or power shaft connections are eliminated and installation is quick and simple in any head box cylindrical screen. There is no water waste, for even the discharge from the oscillator (less than one gallon per minute) is reused to lubricate the deckle strap! For more details of the benefits and savings you can derive from the patented S-13-H write for complete descriptive bulletin.

A. E. BROUGHTON & COMPANY, *Glens Falls, N. Y.*

We also manufacture the S-10-H Oscillating Showers for cleaning cylinder moulds, felts, Fourdriniers, etc., and Unit Vacuum Controls for paper machine suction boxes.

Mutual Boiler Insurance Company, discussed a study of dryer operation to determine causes of failure in boiler operation.

The Tissue sessions were under the chairmanship of Lee M. Bauer, Ecusta Paper Corporation, with the following topics and speakers: "Air Systems for Tissue Machines," W. K. Metcalfe, J. O. Ross Engineering Corporation; "Jones Composite," Charles H. Vickery, E. D. Jones & Sons Company; "New Developments in the Erection of Transite Pipe," J. W. Hemphill, Johns-Mansville Sales Corporation; "Bird Dirtec and its Application to Cleaning Pulp and Paper," Frank Frothingham, Bird Machine Company.

In his address to the Tissue Group, Mr. Norman O. Weil, Assistant Vice President of The W. S. Tyler Company, gave full and thorough description of the manufacture of fourdrinier wires. Taking a one-quarter inch diameter phosphor bronze wire as the start, Mr. Weil illustrated how this wire was drawn down to the finer sizes through metallic dies; how it was annealed in strand annealing furnaces; how the finer wires were redrawn through pure diamond stones; how the funnel shaped holes in the diamonds were cut and he then traced the complete operation of threading up the loom and of weaving the wire.

Following this, Mr. Weil spoke of the exceptional results obtained in using the Patch Welder. Said he—"The Patch Welder was a product of our laboratory and of much research. We knew the welder would make profits for the paper industry; make the work of the operators easier and save the eyesight of many men who formerly sewed wires. However, we never were in the welding business and we had to leave the matter of improved techniques to the ingenuity of you Paper Mill Superintendents and your operators. Here is the most recent astounding development. Believe it or not but, Charley Ludwig and the Mead boys at Chillicothe weld on their patches under water. This is like a diver welding a piece of boiler plate to the hull of a ship under water. It cannot be done you say? Come on up to my room; there is a Patch Welder up there and I will let you do the welding under water. Here, in the Welder, you have both a money maker for the company and a pleasure maker for you. What we ask you to do is advise us of new techniques you develop using the Welder. Pass this information to us and we will pass along the information to the industry. That certainly is the profitable thing for you to do."

Mr. Weil then solicited from the audience reasons why twilled weave wires were preferred by some mills and plain weaves by others. He told of the greater wire body in the twilled weaves and explained why this type of weave was more generally used on high speed machines. He also showed how to figure the percentage of open area in wires of varying meshes.

Association members interested in coated paper making, assembled on May 23 for the Coated Papers section session under the chairmanship of Henry Baldwin, Consolidated Water Power and Paper Company. John Halladay, consultant engineer, discussed "Coating of Paper and Paperboard," while Dr. B. K. Asdell, Edgar Brothers Company, reviewed "The Dispersion of Coating Clays: Its Relation to the Flow Properties of Clay Slips and Coating Colors."

Fine Paper group sessions were handled by Charles Reese of Nekoosa Edwards Paper Company, and four speakers presented papers as follows: "Modern Air Operated Devices for for Paper Machine," Fred R. Erbach, Beloit Iron Works; "Characteristics Desirable in Lithographic Papers," Robert Reed, Lithographic Technical Foundation; "The Effects of Improper Drying on Fine Paper," F. G. Stamm, Stamm Drying Controls; "Use of High Pressure Oscillation Shower Tipes and Stanley Steel Plates with Rotary Screens."

Chairman Walter Brown of the Brunswick Pulp and Paper Company handled the Woodroom and Woods Operations sessions where a film on modern mechanization of wood procurement operations was a feature and N. P. Wardwell, Carthage Machine Company, discussed "Some Facts and Thoughts about Chippers and other Woodroom Equipment." Rudolph Richter, National Container Corporation, also presented some interesting and informing reports on operating results on a ten-knife chipper.

The Board Group presented three speakers and a motion picture "The Building of a B-29" as an added attraction. Glen Sutton, Sutherland Paper Company, was chairman of the Group. Speakers included Paul Harrison, Velocity Steam Production Engineer, who discussed "Volocity Steam Research"; Maxwell A. Goodwin, Clark Equipment Company, who reviewed the science of material handling.

"Characteristics of the Jacketed Steel Drier Roll" was the title of a paper presented by George L. Snyder, assistant manager development engineering, Lukens Steel Company, By-Products Steel Corporation and Lukenweld, Inc., to the Board Group Meeting on Friday afternoon. Snyder demonstrated through his talk how increased production is possible with the double shell drier roll of welded steel construction, developed during over 12 years of experience at Lukenweld, Inc., as designers, engineers and fabricators of drier rolls and machinery and described at length in the PAPER TRADE JOURNAL for August 16.

In addition to Snyder, Lukens Steel Company and its divisions, By-Products Steel Corporation and Lukenweld, Inc., were represented by E. J. Charlton, manager of Development Engineering; William H. Funk, development engineer; and William C. Simpson, manager of sales, Lukenweld, Inc.

Canada International Signs New Wage Pact

MONTREAL, Que. — A new labor agreement increasing the base rate of pay from 70 to 87 cents an hour was signed by officials of the International Paper Company and affiliated firms and several American Federation of Labor unions at the close of a union-management conference in the Mt. Royal Hotel recently.

The affiliated concerns were the New Brunswick International Paper Company, International Fibre Board, Ltd., and the Masonite Company of Canada.

The unions were the International Brotherhood of Paper Makers, International Brotherhood of Pulp, Sulphite and Paper Mill Workers, International Association of Machinists, Brotherhood of Electrical Workers, Union Association of Plumbers and Steamfitters and the International Union of Operating Engineers.

The agreement, covering some 5,000 employes in Quebec, Ontario and New Brunswick, provides also for a general increase of 14 cents an hour for numerous classifications, and an additional two cents an hour for mechanics and helpers.

A. F. of L. union leaders will meet in conference with representatives of six Quebec mills in Montreal to draw up a new agreement in that section of the industry, it was announced.

Crowd Expected At Safety Meetings

WAUSAU, Wis. — The sixteenth annual Wisconsin River Valley Safety Conference will be held here June 5, and is expected to attract more than 500 representatives of northern Wisconsin industries and utilities. Voyta Wrabetz, chairman of the Wisconsin State Industrial Commission, Madison, will be one of the principal speakers. Among the sectional meetings in the afternoon will be one for pulp and paper.

Mead Gets Approval On Office Expansion Project

CHILLICOTHE, O.—Expansion of the personnel and engineering offices of the Mead Corporation, South Paint St., is projected for this summer as materials become available. The addition has been given approval, according to a Mead spokesman, who said that the addition to the rear of the paper plant would afford additional floor space of 33 percent.

Burgee Named to Civic Post

HOLYOKE, Mass. — Mayor Henry J. Toepfert has announced the appointment of Henry V. Burgee, vice-president and general manager of the Parsons Paper Company, to the Gas and Electric Commission to fill a vacancy made by a recent death.

HOW YOU CAN

get more paper from your woodpile

Use groundwood pulp bleached by the Du Pont Peroxide Bleaching Process in your paper furnish.

IF YOU are confronted with the problem of stretching your pulpwood reserve and keeping quality up, here's where the Du Pont Peroxide Bleaching Process can help you.

First, by making groundwood, you can approximately double the fiber yields obtained by the usual chemical pulping processes and can get more pulp to put into paper.

Second, by bleaching the groundwood with the Du Pont process, you can get papers of the same brightness at *lower* cost; brighter papers at no added cost; and still better papers at only *slightly* higher cost. Depending on the properties and qualities required in the finished paper, you can use to good advantage up to 60% of bleached groundwood in your paper furnish.

Du Pont Technical Service Men will assist you in planning, installing, operating and maintaining such a system to meet your specific requirements. Write today for our booklet "More and Better Paper from the Woodpile" or for further details. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.

DU PONT PEROXIDES

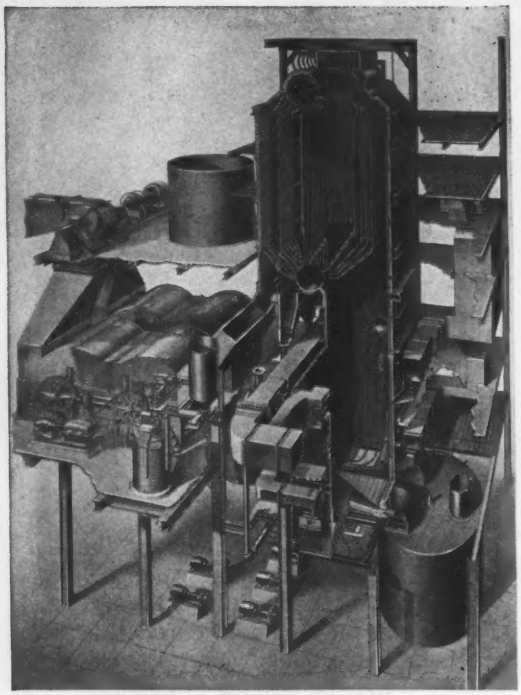
For Groundwood Bleaching

DU PONT
REG. U.S. PAT. OFF.

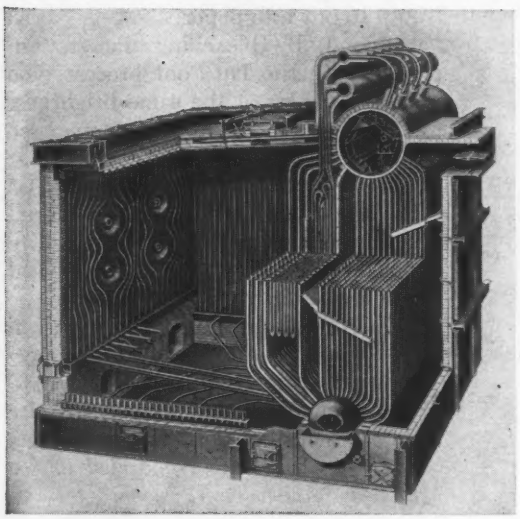
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

"SOLOZONE"
sodium peroxide.

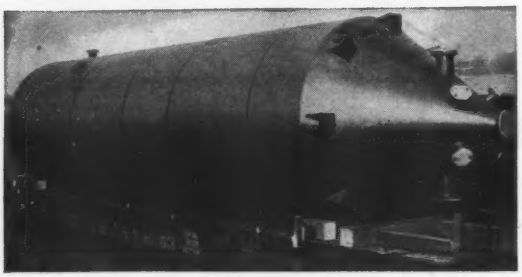
"ALBONE" 35
35% hydrogen peroxide.



C-E RECOVERY UNIT



C-E STEAM GENERATOR, TYPE VU



CYLINDRICAL DIGESTER

A 3-WAY SERVICE TO THE PAPER INDUSTRY

Recovery Unit for Sulphate Mills

The installation of the C-E Recovery Unit in 1938 brought new standards of performance to the sulphate field. The design was literally right from the start and although several refinements, such as increased facilities for accessibility, improvements in the spray burners, the use of air-puff soot blowers, wider application of instrumentation and controls and rearrangement of surfaces to minimize lancing have added considerably to its merit from an operating standpoint, this unit has required no changes in its basic design.

Today, these C-E Recovery Units are in service in many of the best known paper mills throughout the United States and Canada. Many more are under construction or on order. Several of these are repeat orders which reflect the satisfaction of their purchasers gained by actual experience with the equipment.

If you contemplate the purchase of recovery equipment, do not fail to investigate the design and operating advantages of the C-E Recovery Unit.

Steam Generating Units

For all paper mill steam requirements from the largest to the smallest, the C-E Steam Generator, Type VU, has established a reputation for dependable and economical service. VU Units with an aggregate steam capacity of nearly 70,000,000 lb per hr have been purchased by the pulp and paper industry — a striking indication of the extent to which companies in this field have decided that this unit is the best answer to their steam generation problem.

The VU Unit is versatile. It may be fired with pulverized coal, oil, gas or any of these fuels in combination. It is adaptable to the installation of any type of stoker or may be equipped with a barkburning furnace. The paper industry is employing VU Units with these various types of firing in capacities ranging from 20,000 lb of steam per hr up to 225,000 lb per hr, with steam pressures up to 925 psi and total steam temperatures to 825F.

Digesters and Pressure Vessels

Many C-E built cylindrical digesters of the type illustrated, as well as others of the spherical type, are in service in the paper mills of North America. The extensive facilities of C-E Shops are available for the fabrication of many other types of pressure vessels employed in the manufacture of pulp and paper. These are built to your specifications by highly skilled personnel with extensive and diversified experience in this type of work. Consult C-E on your pressure vessel requirements.

A-970-B

COMBUSTION ENGINEERING

200 Madison Avenue, New York 16, N. Y.

C-E PRODUCTS INCLUDE ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT FOR STATIONARY AND MARINE APPLICATIONS

Interested in

Colored Kraft

for Paper Bags as Distinctive as Chain-Store Fronts?

We can render constructive help on formulas and techniques for low-cost kraft-paper coloring.

For economical results on new paper-lines or your current production, in fact...

WHEREVER COLOR IS USED SPECIFY *National Aniline Dyes*

NATIONAL ANILINE DIVISION • ALLIED CHEMICAL & DYE CORPORATION

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BOSTON • PROVIDENCE • PHILADELPHIA • CHICAGO • SAN FRANCISCO • PORTLAND, ORE. GREENSBORO • CHARLOTTE • ATLANTA • NEW ORLEANS • CHATTANOOGA • TORONTO

IMPORTS

NEW YORK IMPORTS

WEEK ENDING MAY 24, 1947

SUMMARY

Newsprint	15,992 rolls
Coated Paper	50 cs.
Printing Paper	13 cs.
Tracing Cloth	16 cs.
Parchment Paper	4 cs.
Gummed Paper	171 cs.
Paperhangings	101 bls., 7 cs.
Filter Paper	14 cs.
Drawing Paper	1 cs.
Tissue Paper	12 cs.
Writing Paper	15 cs.
Strawboard	2893 pkg.

NEWSPRINT

H. G. Craig Co., A.C.D., Donnacona, 391 rolls.

News Syndicate Co., Colabee, Baie Comeau, 7423 rolls.

Bowater Paper Co., Liverpool Packet, Cornerbrook, N.F., 1579 rolls.

Bank of The Manhattan Co., Liverpool Packet, Cornerbrook, N.F., 47 rolls.

N. Y. Journal American, Markland, Liverpool, N.S., 1140 rolls.

N. Y. Tribune, Inc., Markland, Liverpool, N.S., 1653 rolls.

N. Y. World-Telegram, Markland, Liverpool, N.S., 684 rolls.

Brooklyn Eagle, Markland, Liverpool, N.S., 862 rolls.

Herald Statesman, Inc., Markland, Liverpool, N.S., 42 rolls.

Richmond Newspapers, Inc., Markland, Liverpool, N.S., 1801 rolls.

H. G. Craig Co., Donpaco, Donnacona, 370 rolls.

COATED PAPER

F. P. Gaskell, Fort Musquarro, Liverpool, 50 cs. (for cigarette tipping).

PRINTING PAPER

Stevens Nelson Paper Corp., Shooting Star, London, 3 cs.

Oxford University Press, Zona Gale, Manchester, 10 cs.

TRACING CLOTH

E. Dietzgen & Co., Fort Musquarro, Liverpool, 6 cs. (cotton).

Keuffel & Esser Co., Zona Gale, Manchester, 10 cs. (bleached cotton).

PARCHMENT PAPER

H. Reeve Angel & Co., Inc., Czechoslovakia Victory, Antwerp, 4 cs.

GUMMED PAPER

B. F. Drakenfeld & Co., Fort Musquarro, Liverpool, 39 cs.

B. F. Drakenfeld & Co., Zona Gale, Manchester, 132 cs.

PAPERHANGINGS

W. H. S. Lloyd & Co., Shooting Star, London, 93 bls., 7 cs.

W. H. S. Lloyd & Co., Zona Gale, Manchester, 8 bls.

FILTER PAPER

H. Reeve Angel & Co., Inc., Shooting Star, London, 14 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., American Shipper, London, 1 cs.

TISSUE PAPER

B. F. Drakenfeld & Co., Zona Gale, Manchester, 12 cs. (gauze stereotyping & pottery).

WRITING PAPER

American Express Co., Oregon, Havre, 2 cs.

R. F. Downing & Co., Oregon, Havre, 9 cs.

Massce Barnett Co., Oregon, Havre, 1 cs.

Intermaritime Forwarding Co., Oregon, Havre, 3 cs.

STRAWBOARD

Joe Salwen Paper Products Corp., Aalsdyk, Rotterdam, 2587 pkgs.

1st National Bank of Boston, Aalsdyk, Rotterdam, 306 pkgs.

RAGS, BAGGING, ETC.

J. Eisenberg & Son, Phoebe Knot, Havana, 37 bls. old rags.

Continental Bank Trust Co., Aalsdyk, Rotterdam, 74 bls. old cotton rags.

E. Butterworth & Co., Inc., Zona Gale, Manchester, 39 bls. old cotton rags.

A. W. Fenton Co., Marine Snapper, Alexandria, 83 bls. white cotton rags.

E. J. Keller Co., Inc., Steel Mariner, Bombay, 69 bls. old jute rags.

A. W. Fenton Co., Clan Maclaren, Genoa, 41 bls. rags.

WOODPULP

Gottesman & Co., Inc., Mormacpenn, Stockholm, 1 case.

GLUESTOCK, ETC.

H. Remis, Phoebe Knot, Havana, 292 bls. gluestock, 161 bls. dry limed cuttings, 26 bls. fleshings.

Karr Ellis Co., Fort Musquarro, Liverpool, 288 bags dry hidecuttings.

H. Remis, Lott Dan, Havana, 214 bdls. gluestock.

ALBANY IMPORTS

WEEK ENDING MAY 24, 1947

Gottesman & Co., Inc., G. Weems, Svano, 3657 bls. sulphite pulp.

Cellulose Sales Co., G. Weems, Sandarne, 10,160 bls. sulphate pulp.

Cellulose Sales Co., G. Weems, Ostrand, 7600 bls. kraft sulphate pulp.

BOSTON IMPORTS

WEEK ENDING MAY 24, 1947

Bank of New York Trust Co., Exiria, Genoa, 66 bls. old dark cotton rags.

Bank of New York Trust Co., Marine Snapper, Genoa, 184 bls. old dark cotton rags.

Gottesman & Co., Inc., Goonawarra, Gothenburg, 2743 bls. dry sulphite pulp.

Green Kriegsman Paper Co., Goonawarra, Gothenburg, 144 rolls kraft paper.

Cellulose Sales Co., G. Weems, Kamfors, 2764 bls. sulphite pulp.

Price & Pierce, Ltd., G. Weems, Wallvik, 14,520 bls. sulphite pulp.

PHILADELPHIA IMPORTS

WEEK ENDING MAY 24, 1947

Bowater Paper Co., Liverpool Packet, Cornerbrook, N.F., 2475 rolls newsprint.

Elof Hansson, Inc., Mathilda Thorden, Uddevalla, 11,450 bls. strong sulphate pulp.

Elof Hansson, Inc., Goonawarra, Gothenburg, 1000 bls. dry viscose rayon pulp; 1524 bls. dry chemical pulp.

Bank of New York Trust Co., Clan Maclaren, Genoa, 152 bls. fustians.

Putney Mill Resuming Full Scale Operation

PUTNEY, Vt.—The mill of the Putney Company, Inc., has arisen from the ashes of the disastrous fire of ten months ago and has been humming merrily now for about three weeks.

A 72-inch-wide machine turns out eight tons of napkin stock every 24 hours and a 92-inch machine is soon to be installed and in August should be turning out another ten tons every day of three shifts.

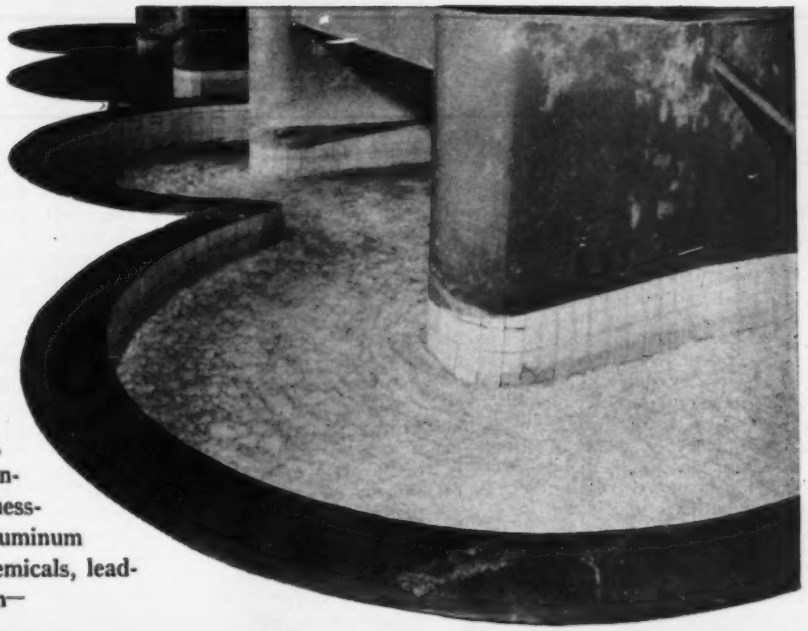
The force of 17 men has been kept on since the first of last June and more men will be taken on when the new machine is ready. Wojcieck Kazmierczak, the principal owner of the mill, who is better known in Putney as John Smith, said that fire insurance not only covered his actual loss in the fire, but interruption insurance paid his men's wages during their long layoff. They were not idle, however, but gave the builder of the new mill considerable help.

The plant today is an entirely new structure with the exception of the boiler room, which was damaged but not destroyed by the fire. Many improvements have been incorporated in the new structure and there are considerable fewer fire hazards.

The converter plant of the Green View Tissue Mills, also made homeless by the fire, will soon be housed in a new building at Putney Station. When the new building is ready, sometime early in the summer, about 40 women and 20 men will be hired to operate the six huge machines which will emboss, fold and package the paper mill's product. The Green View Mills will lease the building from the paper mill and buy its entire output.

At present two machines finish the stock in what was formerly the paper mill's warehouse. During the year before the fire the Putney Paper Co., Inc., grossed about $280,000 worth of business.

sizing



Maximum sizing and pH control call for careful selection of the chemicals used in paper making. Their quality must be uniform, their purity consistent, in order to insure perfect sizing. To take the guesswork out of their selection of Aluminum Sulfate and other paper-making chemicals, leading producers throughout the nation—

SPECIFY "GENERAL CHEMICAL"

ALUMINUM SULFATE

Standard—Ground, 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh; and Lump.

Iron Free—Ground, thru 8 mesh; Lump, approximately 2½".

SODIUM SILICATE

Solutions: From	Wt. Ratio
38° to 60° Baume	(Na_2O to SiO_2) from 1:2.00-1:3.40

Appearance: Opalescent to clear.

GENERAL CHEMICAL COMPANY PRODUCTS for the PAPER INDUSTRY

- Aluminum Sulfate *(Standard and Iron Free)*
- Muriatic Acid *(Hydrochloric)*
- Sodium Fluoride
- Sodium Silicate
- Sodium Metasilicate
- Glauber's Salt, *Crystal or Anhydrous*
- Salt Cake
- Sodium Sulfide
- Sodium Hyposulfite
- Sodium Sulfite, *Anhydrous*
- Sodium Bisulfite, *Anhydrous*
- Disodium Phosphate
- Trisodium Phosphate
- Tetrasodium Pyrophosphate
- Sulfuric Acid
- Nitre Cake *(Sodium Bisulfate)*
- Nitric Acid
- Chrome Alum
- Aqua Ammonia

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Albany • Atlanta • Baltimore • Birmingham • Boston Bridgeport • Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Houston Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh Providence • San Francisco • Seattle • St. Louis • Wenatchee • Yakima (Wash.)

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In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, May 28, 1947.

Manufacturers of rag-content papers are losing their grip on the expanded market they enjoyed during the war. With more an more synthetic fibre rags being mixed with good cotton rags, sorting costs are becoming almost prohibitive for all except the most expensive rag-content papers. Government subsidized cotton at 9 cents a pound is no longer available, while the price of rags has increased considerably over prewar and wartime levels, all adding to the squeeze on rag paper makers. Thus, with wood pulp supplies steadily improving, competitive sulphite bond paper makers are once again in a position to resume the prewar trend, in effect since 1932, toward getting a larger share of the total fine paper business. . . . An exchange of edible oils for newsprint has been arranged between Canada and Argentina. The Canadian Commercial Corporation has been instructed to buy newsprint from all Canadian producers in amounts depending on their production. The newsprint will be shipped to Argentina in return for badly needed edible oils at prices which are below current open market quotations. The exchange is said to be limited to 18,000 metric tons of edible oils in return for approximately the same value of newsprint.

The index of general business activity for the week ended May 17 declined to 145.4 from 145.9 in the previous week, compared with 117.7 for the corresponding week in 1946. The index of paperboard production eased to 185.0 from 187.6 in the previous week, compared with 157.5 for the corresponding week in 1946.

Paper production for the week ended May 17 was estimated at 105.3 percent, compared with 107.9 for the preceding week, with 98.3 percent for the corresponding week in 1946, with 92.5 for 1945, with 90.7 for 1944, and with 92.2 percent for the corresponding week in 1943.

Paperboard production for the week ended May 17 was 102.0 percent of capacity, compared with 101.0 percent for the preceding week, with 92.0 percent for the corresponding week in 1946, with 97.0 for 1945, with 97.0 for 1944, and with 96.0 percent for the corresponding week in 1943.

Five weekly newspapers and one monthly publication are being supplied newsprint by the Mobile Press Register from rolls too badly damaged for satisfactory runs on high-speed presses. As much as a quarter of an inch of newsprint is removed from a roll because of damaged condition, the usable portion is placed in stacks rather than waste bales. Paper from 66½ and 49⅞ inch rolls are folded once before making first cut, after which it is easy for cutters to handle. In some instances some rolls are so badly damaged that it is necessary to remove several hundred pounds of newsprint. The amount salvaged and cut from one such roll is ample supply for one or two weeks for the ordinary small weekly newspaper. The paper is sold to the small newspaper publishers at about the cost of handling and cutting operation. The largest sheet so far furnished from damaged rolls is 36 inches by 44 inches, the latter being the capacity of the company's cutting machine. . . . The Chicago Tribune saves enough waste newsprint each day to print some 14,000 average-size daily papers. They do this by salvaging the final lengths of paper remaining on the cores of the exhausted newsprint rolls, and rewinding them for use in the presses. In this rewinding process, the unused paper on a number of rolls is trimmed, spliced, and sealed together with a rubberized tape to make a usable roll of continuous newsprint.

Finland's converted paper and paperboard industry expanded greatly during the war and now has a more varied and improved line of products available for export. Although many wartime products were provisional substitutes only, a group of products which will certainly be in increasing demand are the various packing requisites, such as cases made of corrugated and extra-stout cardboard boxes, containers, crepe paper used for packing, paper sacks and bags. Although still hampered by lack of special machines and such materials as glue, colors, and dyes, new methods of production and treatment have perfected containers which replace those formerly made of metal or glass. Among the many paper products which will continue in demand even in normal times is graph paper, of which there are more than a hundred different kinds made for use in various registering apparatuses. . . . The Borden Company, realizing that competition has placed a premium on package identity of fluid milk products, has inaugugated a new program of standard milk package design. Fluid milk products have only recently been packaged on a large scale in paper containers. Now "Elsie the Cow" on each container maintains identity of the company. Each product packaged in a different colored carton, has a different design.

Wood Pulp

Imports of wood pulp into the United States from all sources totaled 148,910 tons in April as compared with 118,276 tons in April last year according to the Department of Commerce. Canada ranked as the principal supplier in April of both years. Imports from Canada in April 1947 totaled 131,161 tons, an increase of 23,005 over April 1946. . . . Imports from Sweden in April this year were 15,774 tons or 9,648 tons more than in the same month of last year. . . . One ton of pulp was received from Finland, while a year ago 3,994 tons were received. Norway supplied 1,974 tons in April 1947 against none in the same month of 1946.

Of total imports of all grades in April, 20,389 tons were of rayon and special chemical grades of bleached sulphite, and the balance of approximately 128,521 tons of paper grade pulp. . . . United States consumption of imported pulp by paper mills in recent months averaged around 150,000 tons a month; March consumption increased to 158,684 tons.

Rags

Mill demand for new domestic cotton cuttings is showing less activity than at any other time so far this year. Most mills have more than ample inventories on hand. Despite this easing, quotations remain fairly steady with light percales at around $5.50 to $6 and cottonades about $4.50 to $5 per 100 pounds delivered mill plus dealer's commission.

Old domestic cotton rag market has also eased up considerably. What little business that is being done is done mostly at recent levels. No. 1 whites repacked stay around $5 and repacked thirds and blues about $3 per 100 pounds f.o.b. shipping point plus dealer's commission.

Waste Paper

The heavy Spring flow of paper has resulted in some real easing of folded news, miscellaneous mixed paper, books and magazines. Corrugated is not plentiful, however, as less than 50 percent of potential tonnage of this stock is being collected.

Despite the easing market and plentiful supply of waste paper, prices continue fairly steady. No. 1 hard white envelope cuttings are still at the $120 level. No. 1 white ledger stays $60 to $65 and old assorted kraft at $40 to $50.

Old Rope and Bagging

Market for old rope continues steady with quotations unchanged.

Bagging market currently moderate continues to obtain fairly steady prices. Bright bagging at $4.25; heavy wool tares at $4.75; and domestic No. 1 gunny at $4.25 f.o.b. mills New York, is the usual level.

Advertisers Elect Reed

WORCESTER, Mass.—Russel A. Reed, assistant publicity manager of the Norton Company, has been elected president of the Technical Advertising Association of Boston.

–count on UFORMITES 467 and 470 to do the job easily and at low cost!

LOOKING for a simple, effective way to increase wet strength of paper towels, bag paper, or specialty papers?

If you're working with Kraft, just add UFORMITE 467 at the beater.

Or for sulfite, rag and groundwood—for all papers where low acidity is essential—use UFORMITE 470.

No changes are needed in your production procedure . . . no special equipment required . . . no pretreatment or aging of these urea formaldehyde resins.

As little as 1% resin solids on dry fibre weight boosts wet strength by as much as 300%. Dry tensile, Mullen, fold, uniformity of sizing and surface-coating characteristics are materially improved at the same time.

Write for the full facts on the UFORMITES!

UFORMITE *is a trade-mark, Reg. U. S. Pat. Off.*

Represented by Cia. Rohm y Haas, S.R.L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

PRICES

With the elimination of price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market.

Paper

(Delivered New York)

Standard News, per ton—
Roll, contract ....$84.00 to $90.00
Sheets .....103.00 " 109.00

Kraft—per cwt.—Carload Quantities

Zone A, Delivered
40 lb. base weight

Superstandard Wrapping	$7.00	to	—
No. 1 Wrapping...	6.50	"	6.75
Standard Wrapping	6.00	"	6.25
Standard Bag	5.75	"	6.25

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.

Wh. No. 1 Frd....	1.35	to	1.65
Wh. No. 1 M. G....	1.35	"	1.65
Wh. No. 1½.....	1.20	"	1.45
Wh. No. 2	1.30	"	1.55
Wh. Anti-Tar	2.75	"	4.25
Kraft Unbl.	1.45	"	1.85
Manila No. 2	1.25	"	1.45

Toilet—Per Case of 100 rolls—1 M Sheets.

Unbleached	4.47	to	5.50
Bleached	6.50	"	—

Paper Towels—Per Case of 3750—Zone 1.

Wh. C. fold 11x13¾	4.39	to	4.80
Br. Sgl. fold 10 in.	2.67	"	3.00
Br. M'tif'd 9½x14¾	3.78	"	4.15
Br. M'tif'd 9½x9¾ .	2.67	"	3.00

Manila—per cwt.—C. l. f. a.

No. 1 Jute.....	11.25	to	—
No. 1 Manila 35 lb.	6.00	"	7.00

Boards, per ton—

News $92.50		"	—
Chip 90.00		"	—
Sgl. Mla. L1 Chip*	102.50	"	—
White Pat. Coated*	120.00	"	—
Kraft Liners 42 lb.*	84.00	"	95.00
Binders Boards ..	94.00	"	126.00

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1: Rag Content Bonds and Ledgers—

White, Assorted Items
Bonds, per cwt.

	Carton	4 C't'n	Ton
100% Rag Ext. No. 1	$55.00	$50.00	$48.00
100% Rag	46.50	43.00	41.25
75% Rag	35.00	32.50	31.50
50% Rag	31.50	28.75	27.50
25% Rag	28.00	25.50	24.50

Ledgers, per cwt.

100% Rag Ext. No. 1	$54.25	$50.00	$48.00
100% Rag	46.25	42.50	40.75
75% Rag	36.00	33.25	31.75
50% Rag	31.00	28.00	27.00
25% Rag	27.25	24.75	23.75

Sulphite Bonds and Ledgers—
White, Assorted Items
Bonds, per cwt.

No. 1	$18.75	$16.25	$15.50
No. 2	17.00	15.25	14.50
No. 4	16.00	14.50	14.00

Ledgers, per cwt.

No. 1	$17.00	$17.00	$16.35
No. 2	17.75	16.25	15.50
No. 4	17.00	15.00	14.25

Free Sheet Book Papers—
White, Cased Paper

(Per cwt.)	Case	Ton
No. 1 Glossy Coated...	$19.40	$18.60
No. 2 Glossy Coated...	18.15	17.35
No. 3 Glossy Coated...	17.65	17.00

(Per cwt.)	Case	Ton
No. 1 Antique (Water marked)	$14.90	$14.25
No. 2 Offset	15.35	14.70
A Grade E. F.....	13.90	13.30
A Grade S. & S. C.....	14.40	13.70
B Grade E. F.....	Nominal	
B Grade S. C.....	Nominal	
C Grade E. F.....	Nominal	
C Grade S. C.....	Nominal	
D Grade E. F.....	Nominal	
D Grade S. & S. C.....	Nominal	

Wood Pulp

Domestic mill prices delivered with former OPA freight allowances.

	Per Short ADT
Groundwood	$75.00 to $80.00
Unbleached Sulphite.	115.00 " 117.00
Bleached Sulphite ..	121.00 " 125.00
Bleached Soda	115.00 " 120.00
Unbleached Kraft ...	112.50 " 120.00
Southern Kraft	90.00 " 102.50

Canadian mill Prices delivered with freight allowances unless otherwise specified:

	Per Short ADT
Select Unbleached Kraft (no freight allowance)	115.00 " —
Unbleached Sulphite.	115.00 " 117.00
Glassine Unbleached Sulphite (no freight allowance)	112.00 " —
Bleached Soda	105.00 " 115.00
Groundwood	75.00 " 80.00
Sideruns Pulping News	75.00 " 80.00
Hardwood and Specialty Grades	Nominal

Swedish Quotations
Ex. dock, New York

	Per Short ADT
Bleached Kraft .....$150.00 to	156.00
Bleached Sulphite ...	151.00 " 158.50
Unbleached Sulphite..	121.00 " 131.00
Unbleached Kraft	116.00 " 126.00

Finnish Quotations
Ex. dock, New York

	Per Short ADT
Bleached Sulphite	$165.00
Unbleached Sulphite	132.50
Unbleached Sulphite (special grade)	137.50
Unbleached Sulphate	132.50
Unbleached Sulphate (special grade)	159.00

New Domestic Cotton Cuttings

(Prices delivered Mill Plus Dealer's Commission)

White Shirt .....$11.50 to	$12.00	
Light Silesias	7.50	
Unbleached Muslin ...	11.50 "	12.00
White Back Blue Overalls	8.25	
Blue Overalls	7.75	
Unbl. Fancy Shirt....	4.50 "	5.00
Light Percales	5.50 "	6.00
Light Prints	5.25 "	5.95
Washables	4.00	
Bleachable Khaki	5.50 "	6.00
Unbleachable Khaki ..	5.00 "	5.50
Cottonades	4.50 "	5.00

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked.....	$5.00
No. 1 Whites Miscellaneous..	4.25
No. 2 Whites Repacked.....	4.00
No. 2 Whites Miscellaneous..	3.50
Blue Overalls	3.75
Thirds and Blues Repacked..	3.00
Thirds and Blues Miscellaneous	2.50
No. 1 Roofing Rags.....	2.20
No. 2 Roofing Rags.....	2.10
No. 3 Jute Bagging.....	2.00
No. 4 Brussels and hard back carpets	2.00
No. 5A Roofing Rags.....	2.00

New Foreign Cotton Cuttings

(Prices delivered Mill)

	Per 100 lbs.
New Dark Cuttings....	$6.00 to —
New Mixed Cuttings...	6.50 " —
Light Silesias	9.00 " 10.00
Light Flannelettes	8.00 " 9.00
New White Cuttings ..	13.00 " 15.00
Fancy Shirt Cuttings...	9.00 " 10.00
Light Prints	8.00 " 10.00
Bleachable Khaki, No. 1	7.00 " 7.50
Unbl. Khaki, No. 1....	6.25 " 6.75

Old Foreign Rags

(F.O.B. New York)

	Per 100 lbs.
No. 1 White Linens...	$14.00 to 16.00
No. 2 White Linens...	12.00 " 13.00
No. 3 White Linens...	8.00 " 9.00
No. 4 White Linens...	8.00 " 9.00
No. 1 White Cottons...	10.00 " 12.00
No. 2 White Cottons...	8.00 " 9.00
No. 3 White Cottons...	6.50 " 7.00
No. 4 White Cottons...	5.00 " 5.50
Extra Light Prints....	7.50 " 8.00
No. 1 New Light Prints	6.25 " 6.75
Med. Light Prints.....	5.25 " 5.75
Dutch Blue Cottons....	5.25 " 5.50
Checks and Blues.....	4.00 " 4.25
Linsey Garments	3.00 " 3.75
Dark Cottons	2.50 " 3.00
Old Shopperies	2.50 " 3.00
New Shopperies	2.50 " 3.00

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1..	$4.75 to 5.00
Domestic Gunny, No. 1	4.25 " 4.50
Light Wool Tares.....	4.50 " 4.75
Heavy Wool Tares.....	4.75 " 5.00
Bright Bagging	4.25 " 4.50
Foreign Manila Rope...	6.00 " 7.00
Domestic Manila Rope	5.75 " 6.50
Jute Strings	4.50 " 5.00
No. 1 Sisal Strings ..	5.50 " 6.00
Mixed Strings	1.75 " 2.50

Waste Paper

Prices to Mills
(Dollars Per Ton)
F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut .....$100.00@$120.00	
No. 1 Hard White Envelope Cuts	90.00 " 100.00
No. 1 Hard White Shavings, unruled..	100.00 " 110.00
No. 1 Hard White Shavings, ruled ...	80.00 " 90.00
Soft White Shavings, one cut	95.00 " 105.00
No. 1 Soft White Shavings	85.00 " 95.00
Soft White Shavings, Misc.	65.00 " 75.00
No. 1 Fly Leaf Shavings	55.00 " 60.00
No. 2 Fly Leaf Shavings	50.00 " 55.00
No. 1 Groundwood Fly Leaf Shavings	30.00 " 33.00
No. 2 Mixed Groundwood Fly Leaf Shavings	(nominal)
Mixed Colored Shavings	(nominal)
Mixed Groundwood Colored Shavings...	(nominal)
Overissue Magazines..	(nominal)
No. 1 Heavy Books & Magazines	30.00 " 37.50
Mixed Books	15.00 " 20.00
No. 1 White Ledger..	60.00 " 65.00
New Manila Envelope Cuttings, one cut..	100.00 " 110.00
New Manila Envelope Cuttings	65.00 " 75.00
Extra Manilas	35.00 " 40.00
Mixed Kraft, Env. & Bag Cuttings	75.00 " 85.00
Kraft Envelope Cuttings	100.00 " 105.00
Triple Sorted, No. 1 Brown Soft Kraft.	60.00 " 70.00
New 100% Kraft Corrugated Cuttings ..	60.00 " 70.00
No. 1 Assorted Old Kraft	40.00 " 50.00
New Jute Corrugated Cuttings	27.00 " —
Old 100% Kraft Corrugated Containers.	(nominal)
No. 1 News	19.00 " 20.00
No. 1 Mixed Paper..	17.00 " 19.00
Box Board Cuttings..	20.00 " —
White Blank News...	75.00 " 80.00
Overissue News	(nominal)
Old Corrugated	28.00 " 30.00
Mill Wrappers	22.00 " 25.00

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished— India	.26	@	.29
Fine Polished— Fine India	.31	"	.35
Unpolished— Paper Makers	.20	"	.26
Tube Rope	.22	"	.27½
Wrapping	.26	"	.33½
Cotton	.70	"	—
(Hard Fiber)			
Mex. Sisal	.21	"	.24
Manila	.33	"	—
(Hemp)			
Polished Hemp	.63	"	—

PHILADELPHIA

Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

Shirt Cuttings—			
New White No. 1..	.10½	@	.11
New White No. 2..	nominal		
Light Silesias	.07½	"	.08
Black Silesias, soft	.06½	"	.07
New Unbleached ..	.10½	"	.11¼
Washable Prints ..	.06½	"	.07
Washable No. 1....	.05	"	.05½
Blue Overall	.07½	"	.08
Cottons—According to grades—			
Washable Shredding	.03½	"	.04
Fancy Percales ...	.06¾	"	.07¼
New Black Soft....	nominal		
Khaki Cuttings—			
Unbleachable Cotton Cuttings	.05½	"	.06
Bleachable Cotton Cuttings	.06½	"	.07
Men's Corduroy ..	.05½	"	.06
Ladies' Corduroy ..	.05	"	.05½
Cottonades	.05½	"	.06

Domestic Rags (Old)

(F.O.B. Eastern Shipping Point)

White No. 1—Repacked	4.50	@	5.00
Mixed White	4.00	"	4.25
White No. 2—Repacked	3.50	"	3.75
Thirds and Blues— Miscellaneous	2.25	"	2.50
Repacked	2.75	"	3.00
Roofing Stock— Foreign No. 1.....	nominal		
Domestic No. 1....	2.00	"	2.05
Domestic No. 2....	1.90	"	1.95
Roofing Bagging ..	1.90	"	1.95
Old Manila Rope....	5.75	"	6.00

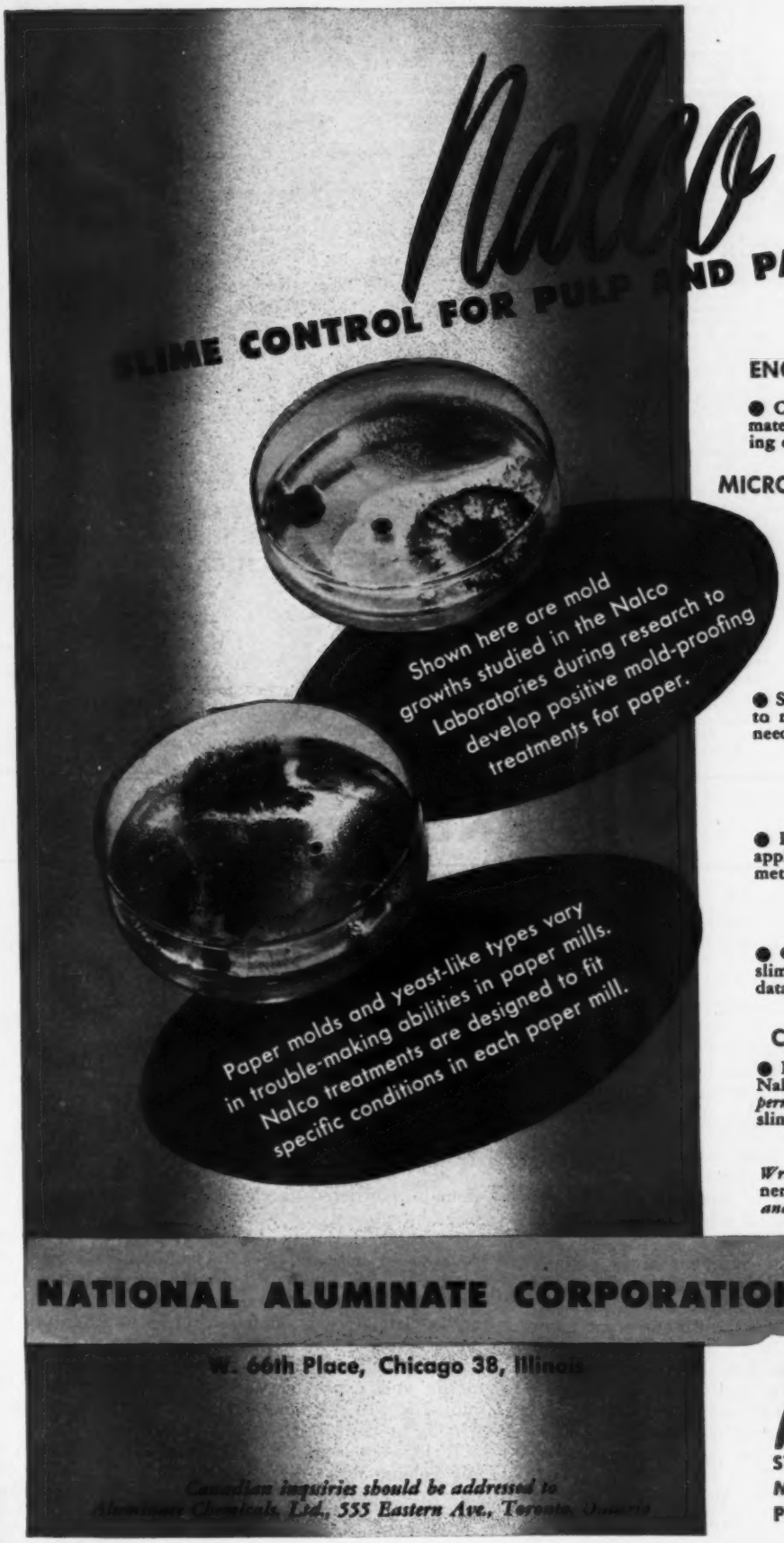
Bagging

(F.O.B. Eastern Shipping Point)

Gunny No. 1— Foreign	nominal		
Domestic	4.25	@	4.50
No. 1 Clean Bright— Sisal Strings	.04	"	.04½
No. 2 Clean Bright— Sisal Strings	.03	"	.03½
Sisal Jute	.02¾	"	.03
Scrap— No. 1	3.25	"	3.50
No. 2	1.75	"	1.85

Nalco

SLIME CONTROL FOR PULP AND PAPER MILLS


Shown here are mold growths studied in the Nalco Laboratories during research to develop positive mold-proofing treatments for paper.
Paper molds and yeast-like types vary in trouble-making abilities in paper mills. Nalco treatments are designed to fit specific conditions in each paper mill.

ENGINEERING SURVEYS

● Complete analyses of raw materials, equipment, and operating conditions *in your mill.*

MICROBIOLOGICAL SURVEYS

● Classification of microorganisms in fresh water, white water, pulp, slurries and slime... their variations and concentrations.

SELECTION OF TREATMENT

● Specific chemicals for treatment to meet variable slime control needs . . . *positively.*

APPLICATION OF TREATMENT

● Instruction of mill personnel in application, feeding, and control methods.

SLIME RECORDS

● Convenient forms for recording slime conditions and treatment data.

CONTINUING SERVICE

● Regular calls by experienced Nalco Service Engineers assure *permanent* maintenance of complete slime control.

Write for detailed data on permanent *slime control system for pulp and paper mills.*

NATIONAL ALUMINATE CORPORATION

W. 66th Place, Chicago 38, Illinois

Canadian inquiries should be addressed to Aluminate Chemicals, Ltd., 555 Eastern Ave., Toronto, Ontario

Nalco

THE SCIENTIFIC SYSTEM OF WATER TREATMENT OF THE PULP AND PAPER INDUSTRY

Wool Tares, heavy	4.00	"	4.25
New Burlap Cuttings	6.00	"	6.50

Old Papers

(F. o. b. Phila.)

Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	@	$115.00
No. 1 Hard White Shavings, unruled	100.00	"	—
Soft White Shavings, one cut	90.00	"	95.00
White Blank News	60.00	"	65.00
Soft White Shavings	80.00	"	—
No. 1 White Ledger	75.00	"	80.00
Ledger, colored	60.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	45.00
Overissue Magazines	nominal		
New Manila Envelope Cuttings	80.00	"	—
No. 1 Assorted Old Kraft	60.00	"	65.00
No. 1 Mixed Paper	20.00	"	—
Box Board Cuttings	20.00	"	—
Kraft Corrugated Cuttings	nominal		
Old Corrugated	30.00	"	35.00
Overissue News	40.00	"	—
No. 1 News	—	"	30.00

BOSTON

Old Papers

(F. o. b. Boston)

Mill Prices, Baled

No. 1 Hard White Shavings, unruled	7.00	@	8.00
No. 1 Hard White Shavings, ruled	7.00	"	8.00
Soft White Shavings, Misc.	6.25	"	6.50
No. 1 Fly Leaf Shavings	1.65	"	1.80
No. 2 Fly Leaf Shavings	2.00	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	1.25	"	1.50
Mixed Colored Shavings	2.50	"	2.75
New Manila Envelope Cuts, one cut	5.00	"	5.50
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	3.50	"	3.75
Mixed Kraft Env. & Bag Cuttings	3.75	"	4.00
Kraft Envelope Cuttings	3.75	"	4.00
No. 1 Heavy Books & Magazines	2.50	"	2.60
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	4.25	"	4.50
Groundwood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	3.50	"	—
No. 1 Mixed Paper	—	"	.95
Overissue News	1.50	"	1.75
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.50	"	—
Jute Corrugated Cuttings	1.07½	"	—
Paper Strings	2.25	"	2.50

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	—	@	4.75
Domestic	—	"	4.75
Sisal Rope No. 1	6.00	"	—
Sisal Rope No. 2	5.50	"	—
Mixed Rope	5.25	"	—
Mixed Strings	2.00	"	2.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	3.50
Manila Rope—			
Foreign	(nominal)		
Domestic	6.25	"	—
Soft Jute Rope	5.00	"	5.25
Jute Carpet Threads	6.00	"	—
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	—	"	4.75
Domestic	—	"	4.87½
South America	5.25	"	—
Wool Tares—			
Foreign	4.50	"	—
Domestic	4.50	"	—
Aust. Wool Pouches	5.00	"	5.25
New Zealand Wool Pouches	5.25	"	5.50
New Burlap Cuttings	6.00	"	6.50
Heavy Baling Bagging	5.25	"	5.75
Paper Mill Bagging	3.50	"	3.75
No. 1 Roofing Bagging	1.75	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.07	@	.07½
Fancy Percales	.07½	"	.08
New White No. 1	.10	"	.11
New Light Flannelettes	.08	"	.08½
Canton Flannels, Bleached	.10	"	.11
Underwear Cutters, Bleached	.10	"	.11
Underwear Cutters, Unbleached	.11	"	.12
Silesias No. 1	.07	"	.08
New Black Silesias	.05	"	—
Red Cotton Cuttings	.05	"	—
Soft Unbleached	.11	"	.12
Blue Cheviots	.07½	"	.08
Fancy	.06	"	—
Washable	.06	"	—
Khaki Cuttings	.06	"	.07
O. D. Khaki	.07	"	—
Corduroy	.03½	"	—
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.10	"	.11

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	2.00	"	—
No. 2	1.90	"	2.00
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	6.00	"	—

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

Mill Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	$110.00	@	$120.00
No. 1 Hard White Shavings, unruled	105.00	"	115.00
No. 1 Soft White Shavings	80.00	"	95.00
No. 1 White Ledger	55.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	43.00
White Blank News	43.00	"	49.00
Mixed Kraft Env. & Bag Cuttings	75.00	"	85.00
No. 1 Assorted Old Kraft	45.00	"	55.00
Overissue News	28.00	"	—
No. 1 News	25.00	"	—
No. 1 Mixed Paper	20.00	"	—
Old Corrugated	36.00	"	—
Mill Wrappers	22.00	"	—

MARKETS

BLANC FIXE—Supplies fair to good as demand continues steady, deliveries slow. Pulp is currently quoted at $55 per ton, in barrels, car lots, at works; and $60 less car lots same basis.

BLEACHING POWDER—Adequate supplies to meet current demands. Shipments sometimes delayed. Quotations are unchanged. Prices on bleaching powder range from $2.75 to $3.75 per 100 pounds.

CASEIN—Current prices on processed acid precipitated casein are reported around 27 to 30 cents per pound for domestic grades and 28 to 34 cents for imported grades f. o. b. shipping point.

CAUSTIC SODA—Demand continues to exceed output with little relief seen for domestic or export markets. Solid caustic soda is reported at $2.50 per 100 pounds; flaked and ground offered at $2.90 to $3 per 100 pounds, car lots, at works.

CHINA CLAY—Demand continues heavy, supply tight. Domestic filler clay is currently $8.50 to $9 per ton, car lots. Coating clay is $12 car lot and $16 less car lot. Imported clay is currently quoted at from $17 to $35 per ton, in car lots, export warehouse.

CHLORINE—Production falls behind as demand reaches new levels. Lack of tank cars continues to hamper deliveries. Quotations unchanged. Chlorine is currently quoted at $2 to $3.50 per 100 pounds.

ROSIN—Gum rosin in drums, per 100 pounds, net, in yard New York, car lots, B, D, $10.80; E, F, G, H, I, K, M, $11.80; WG, $12.05; WW, $12.05. Wood Rosin, per 100 pounds, l. c. l. f. o. b. N. Y., B, $7.45; FF, $8.95; G, H, I, $10.25; WW, and X, $10.45.

SALT CAKE—Supplies show little improvement as demand continues to increase. Prices remain unchanged. Domestic salt cake is quoted at $20.00 to $26 per ton in bulk. Chrome salt cake is quoted at $16 per ton.

SODA ASH—Demand active as supplies continue short, previous orders filled. Contract orders prevail at the same high levels. Current prices, car lots, per 100 pounds, are as follows: in bulk, $1.08; in paper bags, $1.20; and in barrels, $1.60.

STARCH—Domestic demand absorbs capacity production leaving little for export. Starch prices continue strong with the pearl grade quoted at $4.67 per 100 pounds; powdered starch at $4.78 per 100 pounds, car los, Chicago.

SULPHATE OF ALUMINA—Active demand covered by fair supplies. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f. o. b. works. Iron free is quoted at $1.95 to $2.25 per 100 pounds, in bags at works.

SULPHUR—Plentiful supplies to meet active domestic and export demands. Annual contracts are quoted at $16 per long ton, f. o. b. mines; the price f. o. b. at Gulf Ports is $17.50 per long ton.

TALC—Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $35 to $45 per ton. All prices in car lots.

TYPE "AA"
ONE OF FIVE TYPES
BUILT 40" TO 265"
WIDE, AND UP.
SPEEDS, 1500 TO
3000 F. P. M.

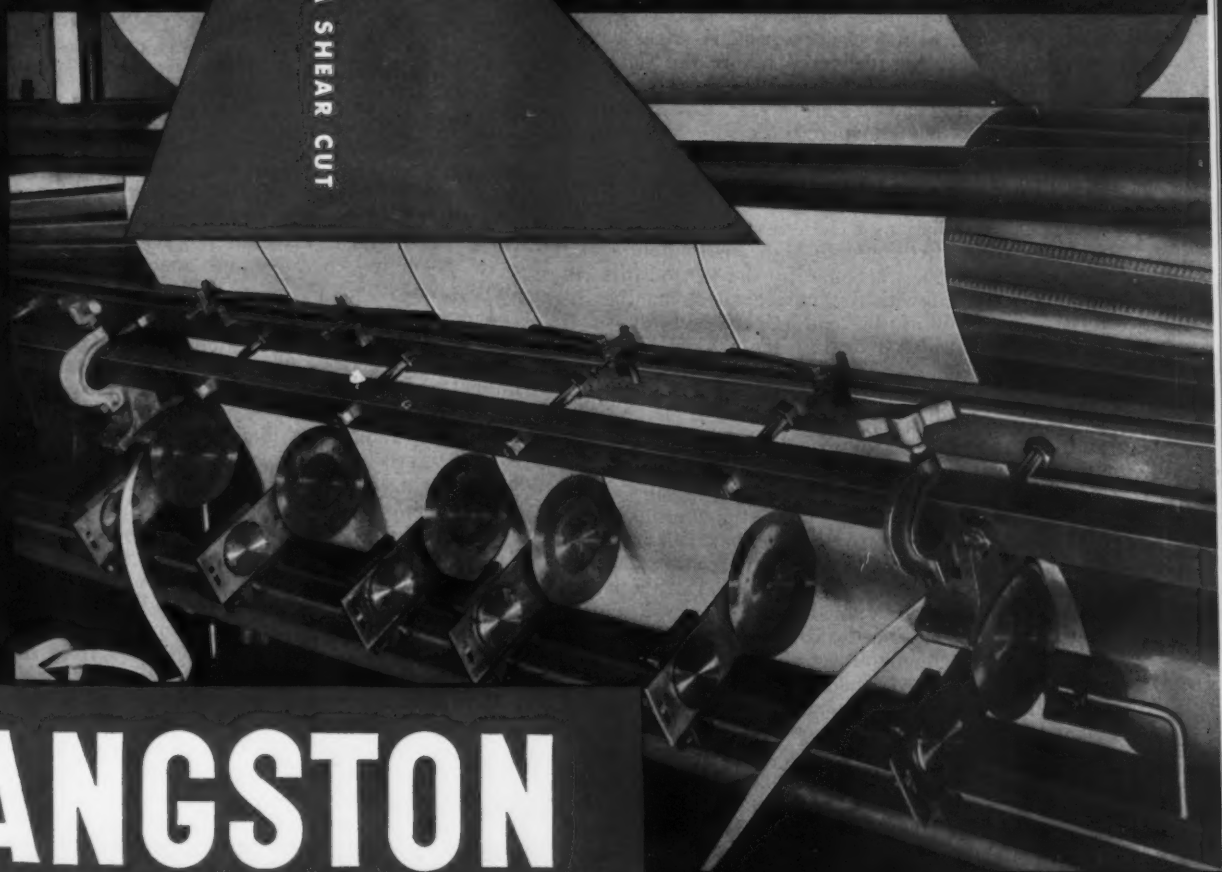
ILLUSTRATED BELOW IS THE GREATLY IMPROVED METHOD OF SLITTING, NOW INCORPORATED INTO ALL LANGSTON SLITTERS AND ROLL WINDERS.

WITH THIS METHOD, OVERLAP OF BLADES IS CONTROLLED — IT ALSO COMPENSATES FOR REDUCED DIAMETER FROM GRINDING BLADES.

THREAD-UP AND SET-UP TIME IS REDUCED; SLITTER LIFE INCREASED; MAINTENANCE AND DOWN-TIME LESSENED. ASK FOR COMPLETE DETAILS.

SAMUEL M. LANGSTON COMPANY—CAMDEN, N. J.

A CLEAN CUT · A SHEAR CUT



LANGSTON

SLITTERS AND ROLL WINDERS

Report On The Commercial Production Of High Yield Sulphite And Sulphate Pulps

By Douglas G. Sutherland, Sutherland Refiner Corporation

During the past ten years the Paper Industry has experienced a continuous rise in the cost of wood. With the industry expanding rapidly and a corresponding increase in the demand for wood, there is little prospect of any decrease in the cost in the near future. At the best, we can only hope for a stabilizing of the price at about the present level. Faced with this problem and realizing that wood is the major raw material of paper, the industry as a whole is looking for a solution which will materially reduce or at least stop the continuously rising price of wood.

Several approaches are being made to this problem, but the one which is receiving the greatest attention is a method of securing higher yields of pulp from each cord of wood.

Realizing that the price of wood must rise, a 48" Sutherland refiner was placed in operation in the production of high yield sulphite in 1936. This sulphite was used in newsprint papers. A paper covering this subject was delivered before the Canadian Technical Section in January, 1937, by Dr. H. W. Rowley. Nothing can be added to Dr. Rowley's paper except to say that commercial operations produced a yield of 63%. Economic conditions have been such that this system has not been widely adopted. However, equipment is now being produced to complete additional installations. There have been some objections to the dirt count in high yield sulphite, but this can readily be overcome by the use of dirt removal equipment which is now available to the industry. The cost of this equipment is a very small item when considered against the savings accruing from high yields.

After the successful installation on sulphite, Mr. D. Manson Sutherland initiated some discussions as to the possibilities of installing a similar system in a sulphate mill. In 1937 Sutherland refiners were installed between the blow tank and washers in a southern kraft mill. Some interesting results were obtained. Washing improved somewhat with a tighter mat on the vacuum washers without any knots being present. At the same time some changes in the character of the stock were noted in the papermill. However, the tests could not be continued because of the presence of large quantities of tramp metal in the pulp which seriously damaged the stainless steel refiner discs. Lack of consistency control, also, contributed to poor refiner operations. Wide variations in consistency caused fluctuations in refiner operating conditions preventing the continuous production of a uniform quality pulp. Conditions were such in the mill at that time that provisions could not be made to adequately remove tramp metals or control consistency, consequently, the tests were abandoned without proving the advantages or disadvantages of the system.

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

However, it was felt that there were sufficient interesting signs to warrant further trials. The war years interfered with the resumption of this work until 1945. At this time an opportunity arose to install two Sutherland refiners in the pulp mill of the Bathurst Power & Paper Company, Ltd., for the production of high yield sulphate. In 1946 an additional refiner was added bringing the total to three 48" units. A report on the progress made in this mill was given in January, 1947, at the Montreal Convention of the Canadian Technical Section by Mr. Gordon F. Allo, Control Superintendent of the Bathurst Power & Paper Co., Ltd., in a paper entitled, "Kraft Brown Stock Refining at Bathurst Power & Paper Company Mill". This paper covers the period up to December, 1946. Another paper by D. Mansor Sutherland, president of the Sutherland Refiner Corporation, titled "Progress Report on Continuous Refining of High Yield Pulp at High Temperatures and Alkalinity" was presented before TAPPI in February, 1946. Since that time additional information has been gathered and is included in this paper.

The major change in the mechanical equipment necessary to produce high yield sulphate is the installation of Sutherland Refiners between the blow tank and washers in the pulp mill. Other equipment necessary to maintain and operate the system successfully is a magnetic separator and adequate consistency control.

Pulp is prepared in conventional digesters either rotating or stationary. It is blown into a vertical blow-tank which is equipped with agitation. Pulp is diluted around the area of the agitator with black liquor from the washers. A Foxboro consistency regulator operating a Stabilflo valve controls the consistency of an average of 3.25%. Temperature of the pulp leaving the blow-tank is approximately 175°F.

Pulp is drawn from the blow tank near the top of the bottom cone permitting heavy metal particles to settle to the bottom of the cone for later removal.

The stock is then pumped through a settling box equipped with a magnetic separator. Several designs of the box containing the magnet were tried in an effort to increase the efficiency of the magnet. The present design has now been standardized and gives satisfactory results.

Leaving the magnet the pulp enters a header over the refiners. From this point a valve controls the flow to each refiner. A line returns excess stock from the header to the blow tank. This line is used to regulate the pulp pressure in the header to the point desired by the refiner operators. During the past year inlet pressures to the refiners have been gradually reduced intil today 48" diameter discs operate at approximately 10 lb. pressure/sq. in.

The three Sutherland refiners are installed so that each refiner passes one third of the volume of stock.

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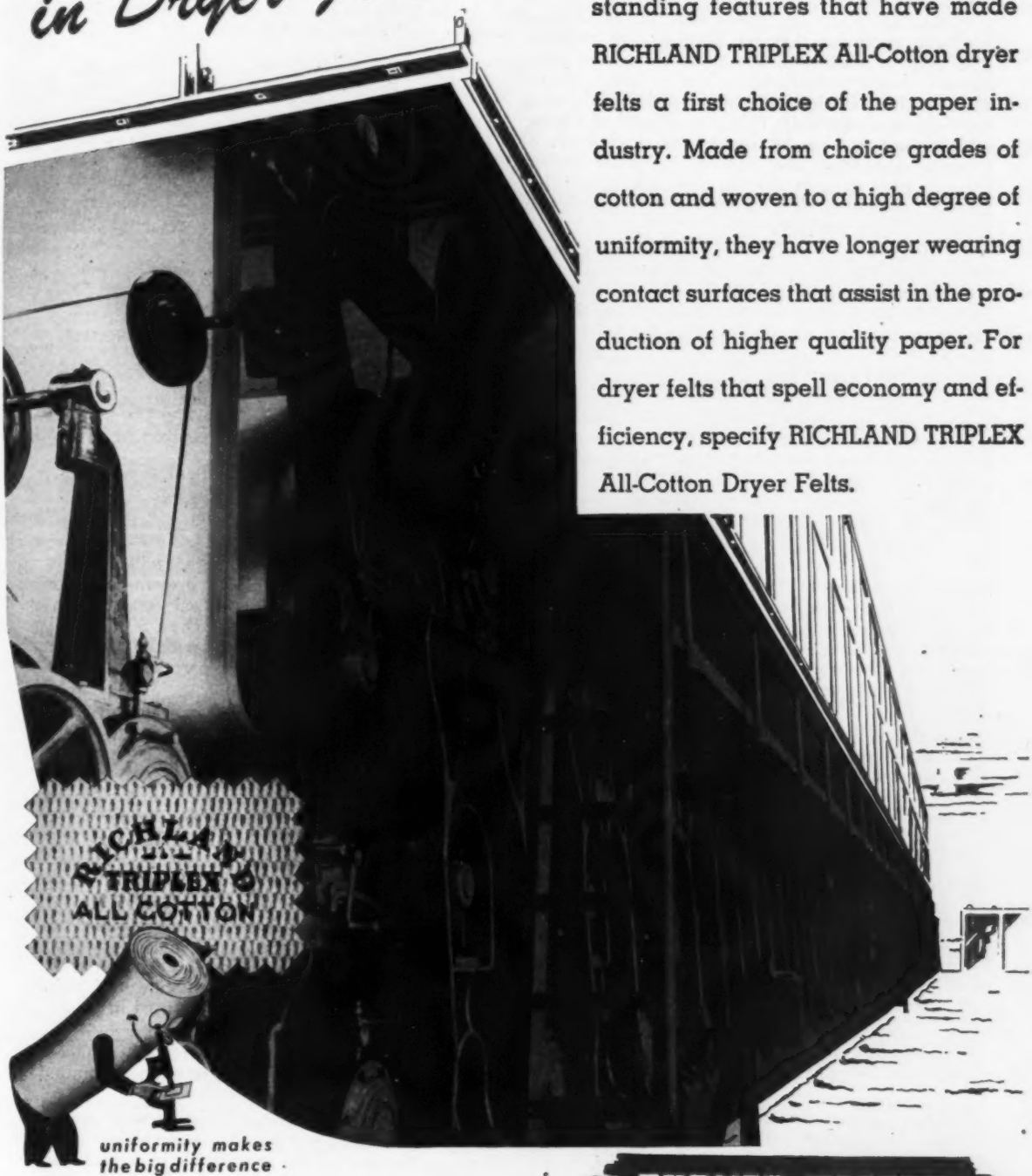

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Refiners are controlled to produce the desired pulp quality by varying refiner setting and inlet pulp pressures. Refiners equipped with 48-inch discs produce in excess of 100 tons/day, 42-inch refiners have a maximum production of approximately 80 tons/day. Power consumption is approximately 2 H.P. days/ton.

From this point on, the system is conventional with the exception that no Knotters are required. The pulp is washed in a continuous system using vacuum washers. It is interesting to note that on these washers efficiency has improved slightly since the refiners were added. This is attributed to a somewhat tighter mat on the washer and the absence of knots or other large fibre bundles. From the washers the pulp goes through screens over deckers and then through additional Sutherland refiners directly behind the paper machine.

An average daily production of 240 tons is turned out of four digesters. Chips are not packed, but the digesters are topped off with chips before the cover is bolted on, Heating is with direct steam through nozzles in the bottom cone. Cooking has been manually controlled, but in the near future fully automatic controls will be installed.

When the brown stock refiners were installed, gradual changes were made in the cooks. The degree of hardness of the pulp was gradually increased by reducing the charge of alkali and shortening the cooking time. Over a period of several months, the cooking time was reduced to a low of two hours twenty-five minutes steam to blow. Active alkali as Na_2O has been reduced to 450 lbs. per ton of pulp. This cook results in a chlorine number of 13 to 14. The mill operated for several months with pulp cooked to this chlorine number. More recently the active alkali as Na_2O has been further reduced to 425 lbs. per ton with a cooking time of averaging 2 hours and 25 minutes steam to blow. This cook results in a chlorine number of 15-16. The yield is approximately 62-63% B D pulp from B D wood.

Experimental cooks have been made which had a chlorine number of 19-20. Insufficient work has been done at chlorine numbers of 19-20 to give accurate data as to quality of pulp. Additional work will be done in the high chlorine numbered pulp and the results reported at a later date.

Pulp sampled at the deckers has the following characteristics:

Chlorine Number	14.0	
Freeness	718	Canadian Standard
Mullen	83%	
Tear	254%	
Breaking length (Metres)	6120	
Stretch	2.7%	
Screen rejects on .006" cut screen	2.8%	

A laboratory beater test on this pulp develops strength as follows:

Beating Time (mins.)	Freeness (cc.)	Bulk	Percent Burst	Tear	Breaking Length (metres)	Percent Stretch
10	701	1.96	157	205	8190	2.9
40	606	1.65	195	162	11400	3.4
60	507	1.56	205	152	11880	3.6
80	376	1.50	210	137	12150	3.6
95	283	1.46	214	134	12260	3.7
110	184	1.45	216	125	12290	3.6
125	103	1.43	215	120	12230	3.5

SCREEN CLASSIFICATION

Freeness	Retained 29 Mesh	28/48	48/100	100/200	Thru/200 Percent
718	73.5	11.4	4.8	2.9	7.4
103	53.5	15.0	8.7	6.9	15.9

This pulp develops strength very rapidly and maintains high strength over a very wide freeness range.

Some idea of the strength of a 16 chlorine number pulp in comparison with pulps of lower chlorine number will be of interest. To arrive at an average strength of kraft pulps, samples of various cooks ranging from 2.0 chlorine to 10.0 chlorine were tested in the laboratory beater and then averaged together. The results were as follows:

Beating Time (mins.)	Freeness (cc.)	Bulk	Percent Burst	Tear	Breaking Length (metres)	Percent Stretch
20	400	1.45	153.7	2.25	8400	3.1

A pulp with a chlorine number of 16 will test as follows:

Beating Time (mins.)	Freeness (cc.)	Bulk	Percent Burst	Tear	Breaking Length (metres)	Percent Stretch
20	660	1.86	182.0	1.96	10600	3.2

A pulp with a chlorine No. of 16 which has been bleached to a high white gives the following results:

Beating Time (mins.)	Freeness (cc.)	Bulk	Percent Burst	Tear	Breaking Length (metres)	Percent Stretch
20	500	1.44	220	1.81	12750	3.6

These comparisons are interesting as they clearly indicate the high strengths possible in high yield pulps.

Savings possible in mills using high yield pulps can readily be calculated. Pulp cooked to a chlorine number of 12 - 13 will have a yield of approximately 58% —an increase in yield of from 18 - 20% over normal operators. The savings in wood will be approximately $5 per ton of pulp at present wood prices. Reduction in steam and chemical consumption will result in additional savings of from $0.50 to $1 per ton of pulp giving an overall savings of $5.50 to $6 a ton. Higher yields will have corresponding increase in the savings per ton of pulp.

Work accomplished so far indicates even higher yields are possible. Yields in excess of 70% are possible. What grades other than corrugating can use 70% yield sulphate pulps has not as yet been definitely established.

Experimental work is being done towards the use of high yield pulps for high test bleached and unbleached papers. The results so far indicate that there are few grades in which high yields can not be used.

The production of high yield pulps by the process developed by D. Manson Sutherland is now in commercial operation producing yields of approximately 62 - 63 percent both in the sulphite and sulphate pulps. Sulphate pulp is at present used in production of liner board and corrugating.

High yield pulps have high strength at high freeness which will improve papermachine operation by improving drainage rate.

The savings are substantial at present—averaging approximately $6 per ton of paper which is sufficient to pay the cost of the installation in a year. Higher yields and greater savings are possible with increased experience in the operation of this system.

The application of high yield pulps to five grades of papers is a distinct possibility, and further work is being conducted to establish the cooking and refining procedures which will be necessary to adopt this system to bleached grades.

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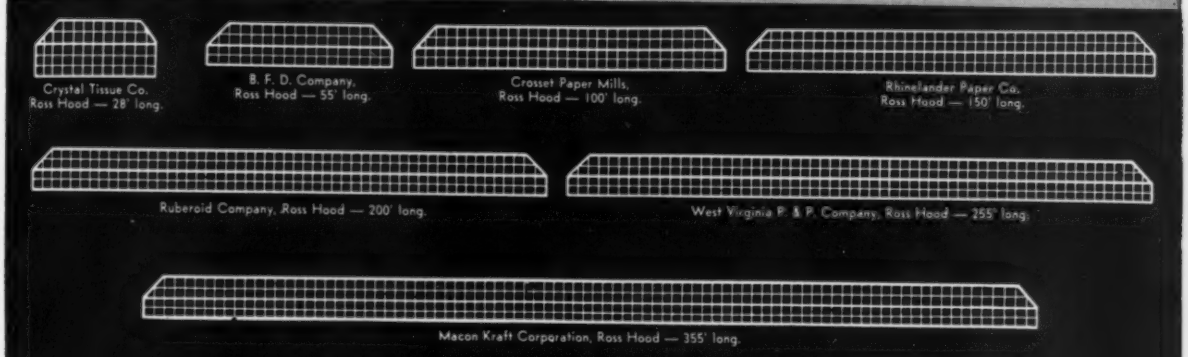
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An Operational Survey of Electrical Equipment in Paper Mills

By L. E. Beck, Resident Engineer, Mutual Boiler Insurance Company of Boston

This paper will be directed primarily to those who are operating plants twenty or more years old. This age was chosen because it was about twenty years ago that the trend toward electrification of paper mills got under way,

We would first like to consider the implications of the 1947 National Electrical Code as compared to the code presented in 1925 and in use in 1927.

Let us first suppose that we have a 200 hp, 440 volt, Jordan motor. This motor would have a full load rating of approximately 240 amperes. In 1927 we could have run a cable in conduit to this motor with a current rating of 110% of the name plate ampere rating of the motor. This would be roughly 265 amperes, and the code at that time said that a 300 MCM was good for 275 amperes so the 300 MCM was run. Today this same motor would require a 500 MCM cable which is now rated at 320 amperes and was then rated at 400 amperes.

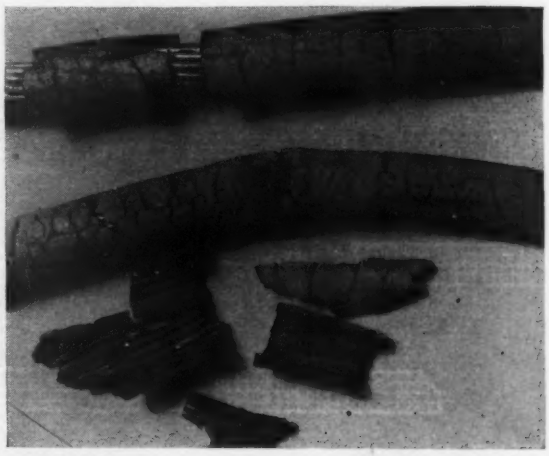
Now let us further suppose that this motor is driving a boiler forced draft fan instead of a Jordan. The cable is run through the boiler room where the summertime room temperature reaches 110° F. which is not at all unusual for many boiler rooms. Our present code states that the cable loading shall be reduced to 71 percent of code rating when operated in a room at this temperature. Seventy-one percent of the code rating of a 1,000 MCM cable is 323 amperes which is the rating of the 500 MCM cable. Therefore, instead of using a 500 MCM conductor, we must use a 1,000,000. In 1927 we had no correction factors to consider.

Now if we should decide to parallel two smaller cables instead of using the 1,000,000, we encounter this: In two 300 MCM we would have a little more than the capacity of one 1,000 MCM, but we find that when four to six cables are run in one conduit, or cable way, we reduce the capacity to 80% of the code table. This means that instead of two runs of 300 MCM, we should use two runs of 500 MCM. Compare this for a moment with the 1927 installation of a single run of 300 MCM.

This does not mean that all cables installed twenty years ago will promptly fail, but it does mean that there are many now in use that are carrying more load than that for which new cable of the same size is now rated.

A survey of the electrical distribution system of most any paper mill will reveal that considerable expansion has been made since its installation and much of the new equipment has been connected to existing circuits. This has been particularly true during the war years when material shortages were so acute.

The temperature attained by a conductor depends on the room temperature, the temperature of the conductor itself and the ability of the surroundings to radiate heat. The amount of energy changed into heat in watts is equal to the resistance of the conductor in ohms times the square of the current in amperes. In effect, this means when the value of the current in a conductor is doubled, the energy loss and heating effect is multiplied by four. Inasmuch as the maximum temperature is an extremely important factor in the life of an insulating material, it is imperative that these things be given serious consideration when contemplating further connections to existing circuits or when new installations are made.



A 19-Year Old Cable

I am quite sure that if you could see the actual condition of some of the insulation hidden in conduits in your mill, you would spend some restless nights until replacements were made.

The picture shows sections of a No. 1/0 Type R cable that had been in service nineteen years. It had served as a main lead to a 100 hp forced draft fan motor and operated under precisely the same conditions as outlined earlier in this paper. Please note the small sections of rubber insulation at the lower center of the slide. They were broken out by merely pinching the cable with the fingers. All semblance of life has been lost and the material is practically worthless as an insulating medium. Incidentally, our present code calls for nothing less than a 250 MCM Type R or a No. 3/0 varnished cambric Type V for the particular service from which this cable was taken instead of the No. 1/0 we see here.

A great many of the electrical failures that are experienced are due to fatigue of the conductor and deterioration of the insulating material. A very prominent manifestation of fatigue is the failure of disconnect and terminal studs. Failure of this kind are not always recognized as fatigue because when the fault occurs, the material at the point of failure

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

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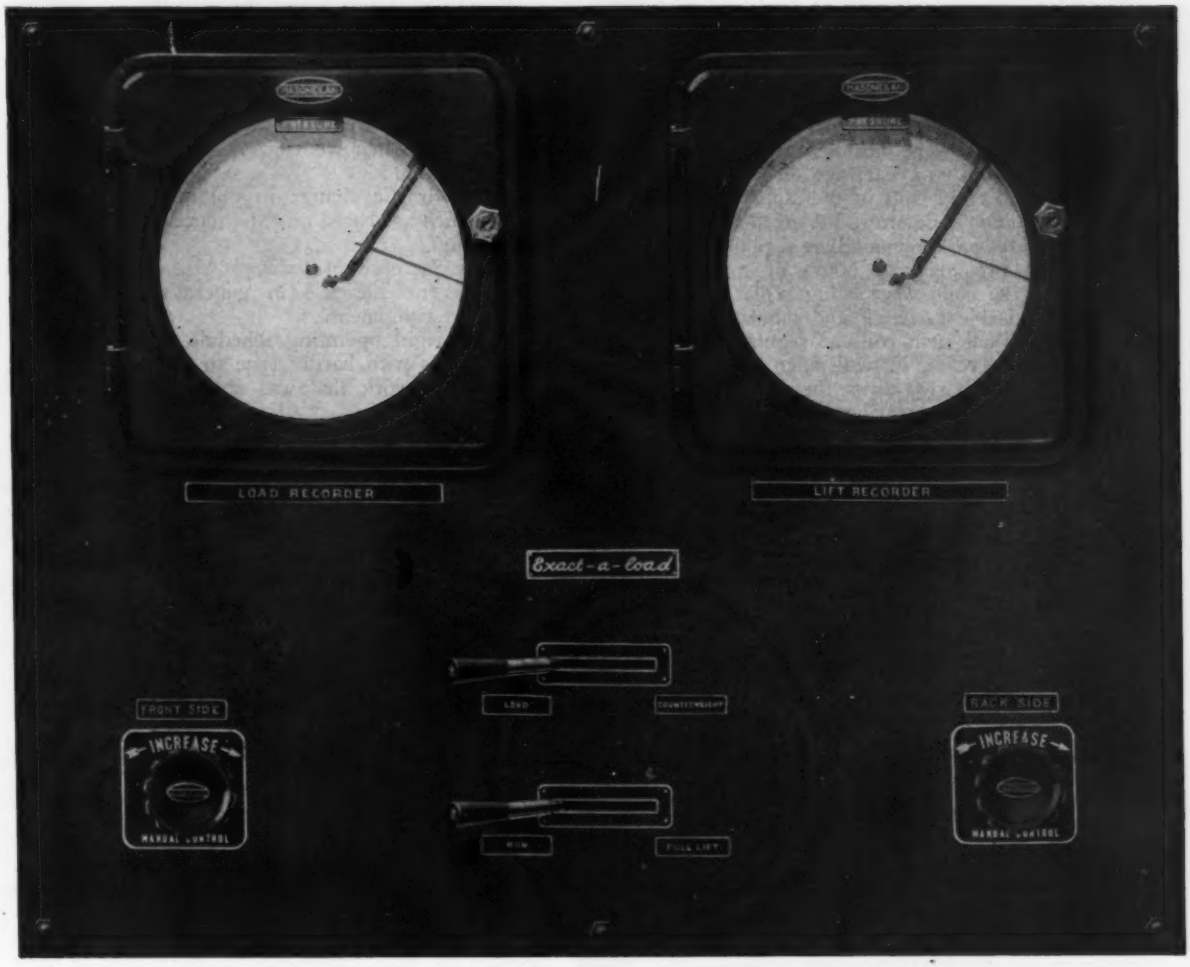

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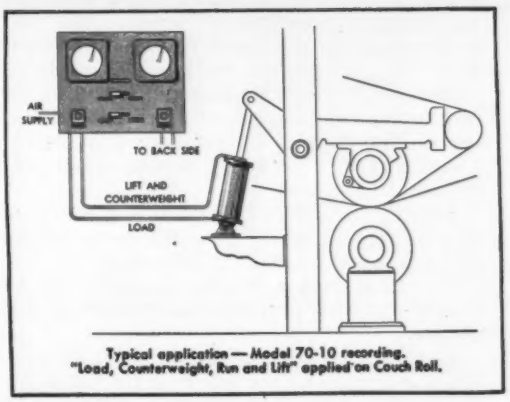

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is usually consumed by the resulting arc and all evidence of fatigue is obliterated.

Due to the exposure and type of operation in a paper mill, twenty years is generally considered to be the safe useful life of a motor winding. Much, of course, would depend on the particular application. Most Jordan motors would be less, and probably a rewinder or similar motor would be more, but generally speaking twenty years is all you can safely expect.

I am familiar with one mill that has several direct current variable speed line shaft drives. These are the usual type that were installed eighteen or twenty years ago. About two years ago several of the voltage regulator and relay coils of the motor-generator control failed due to deterioration of insulation. These failures were not in themselves serious, but in each case from two to three hours of production was lost while the coils were being replaced. It is considered advisable to check and tabulate the internal resistance of all such coils at regular intervals and when any decrease in resistance is noted, which would indicate shorted turns, they should be replaced.

We are currently hearing a great deal about Silicon insulations, but to date we have not had sufficient experience with them to predict their life expectancy under moisture conditions.

The field of the turbo-generator is another point where the effects of age show up. It is considered advisable to test the internal resistance of the field windings at each dismantle inspection. Quite frequently high resistance connections develop at the collector rings in old fields. These are relatively easy to correct, but if they are allowed to remain, they may cause overheating and eventual failure. A low resistance value would indicate shorted turns which could cause an uneven field strength and possibly a mechanical vibration within the machine.

The value of the original resistance can be obtained from the manufacturer by furnishing them with the field number.

I am not trying to imply that the entire electrical system of your twenty-year old mill is just about to collapse, but when we view the entire scene in retrospect we find:

1. The drastic change in the new code requirements which are based on experience gleaned through these years.
2. The increase in tonnage with very little and sometimes no increase in generating, distribution and drive equipment.
3. The rigid operating schedule of the past five or six years with hardly time to do the repair and maintenance work that was absolutely necessary to keep going.
4. The material shortages that have existed during the past few years that has made it extremely difficult to make many of the much needed repairs.

In view of these facts , I think it is now time to seriously consider some additions and replacements to avoid the failures that are sure to come if we try to force the old equipment too far.

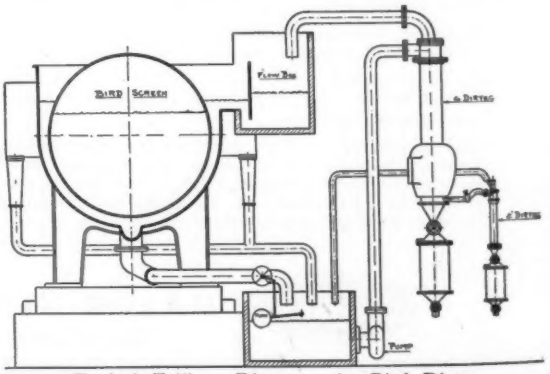
The Bird Dirtec And Its Application To The Cleaning Of Paper Stock

By F. F. Frothingham, The Bird Machine Company

As builders of Bird Screens and Centrifiners for cleaning paper stock and of Jonsson Vibrating Screens and Vibrotor Screens for pulp (the latter so new that we aren't even ready to talk about it yet), my company has what you might call a "vested interest" in the problem of removing dirt from pulp and paper. It was natural, therefore, that we should be interested in still another method of dirt removal than that of removal by size, as in the case of screens or by centrifugal multiplication of the force of gravity, as in the case of centrifining. I am speaking of dirt removal by pressure drop which is accomplished in a relatively simple device which we call the Dirtec.

Although the principle of this machine and the general way in which it works is undoubtedly familiar to most of you I'd like to take a moment to review its operation in order to establish a bit more clearly just what part it occupies in the dirt removal picture.

The stock is pumped to the inlet of the Dirtec which is located on the side near the top and at right angles to the unit itself. The inlet capacity of a single primary Dirtec is 280 gallons per minute, the number of units employed for any given installation depending on the volume to be handled. The pressure at which the stock enters the Dirtec is between 35 and 40 pounds. Consistency may be whatever occurs at the paper machine. If it's around .5% so much the better. The inlet is so shaped as to impart a downward spiral motion to the stock. Entering the vortex chamber the stock experiences a sharp drop in pressure and this plus the whirling motion of the stock has the effect of exaggerating differences in specific gravity between dirt and foreign matter and the fibres. The dirt is then passed without riling it up in any way to the separating chamber which is below the conical baffle near the center of the Dirtec and adjacent to an outlet to the auxiliary section of the



Typical Tailings Diagram, the Bird Dirtec

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

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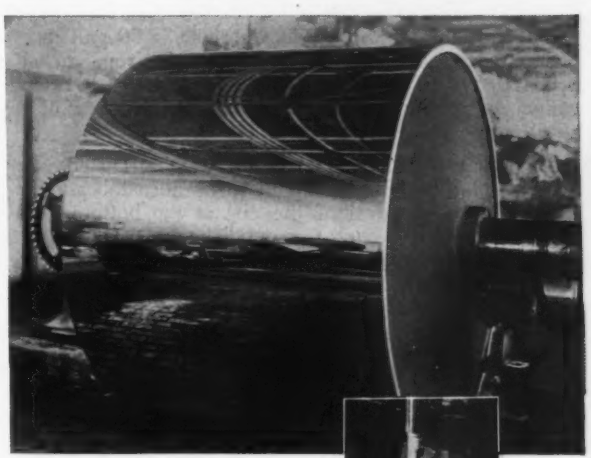

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unit. Advantage is taken in the separating chamber of the fact that the dirt has been separated according to its specific gravity. The heavier dirt remains in the outer portion of the column and is removed and collected in the sump at the base of the primary section of the machine. The finer dirt of greater weight than the fibre, and the light dirt grades itself towards the center of the the column and is transferred to the auxiliary section which puts it through another vortex treatment and collects the dirt at its base. This auxiliary section operates as an integral unit with the primary section, without pumping in between. The pressure in the primary section is sufficient to operate the auxiliary section. It's an exceedingly simple and effective hook-up. The accepted stock from the auxiliary section is returned to the stock supply ahead of the primary section. The collected dirt is removed periodically without interrupting the operation of the machine. The valves just above the sumps at the base of each section are closed, the sumps cleaned out and filled with water and the valves opened. That's all there is to it and the dirt no longer has a chance to sneak back into the stock. It's out for good and all.

The hook-up of primary and auxilary sections depends on the nature of the dirt present in the stock. In some cases, one auxiliary is employed for every three primaries. In some cases, one auxiliary is used with two primaries and other cases, one auxiliary with each primary.

The capacity of the single auxiliary is 30 gallons per minute. The output of clean stock from each primary Dirtec therefore varies from 250 to 270 gallons per minute, depending on the number of auxiliaries used with the installation.

As you can see, the operation of the Dirtec is very simple—nothing to attend to or adjust beyond the occasional removal of the dirt at the bottom of the machine. No moving parts. It takes up very little room and is easy to install both ahead of the paper machine screens and after the screens as a tailings unit.

This latter application of the Dirtec is worth spending a minute on because it is proving a lot more satisfactory and efficient than auxiliary screens and it has already become standard practice on new screen installations. One primary-auxiliary Dirtec unit per screen does the job. The tailings from the bottom of the screen and from the skimming compartments at the discharge end of the screen are pumped directly to the Dirtec. All of this concentrated dirt—the heavy dirt rejected by the screen plates, the fine heavy dirt that settles to the bottom of the screen, and the floating dirt collected in the skimming boxes —is neatly and completely removed by the Dirtec and the clean stock returned right to the screen. Fibre loss from the Dirtec is insignificant—not over 3 lbs. of stock per day per unit.

One great advantage of the Dirtec for handling screen tailings, besides its superior efficiency as a dirt remover, is its ability to handle a much greater volume of tailings than an auxiliary screen,—two or three times the volume. This means vastly improved circulation of stock through the screen and this in turn increases dirt removal efficiency because dirt cannot accumulate and get back into the screened stock. Obviously one Dirtec per screen takes far less space than an auxiliary screen and it makes an exceedingly neat and clean installation.

The Bird Dirtec

The flexibility and effectiveness of the Dirtec as a dirt remover is being taken advantage of in numerous ways. One specialty mill that makes papers that have to be extra clean from stock that contains a lot of hard-to-spearate dirt has installed two Dirtecs, with a single auxiliary section for both, at the end of the line,following screens and centrifiners. They found that they could thus save close to a hundred dollar's worth of stock per day because of the ability of the Dirtec installation to handle the stock from the daily clean-up of the Centrifiners. They pump the screen tailings, Centrifiner wash-downs and all the water, wet broke and trim from the couch pit right through the Dirtecs before it goes to the Bird Save-all. They find that the entire cleaning and recovery system operates better as well as paying a substantial profit in the form of stock savings. The Dirtecs permit running 10 to 15% tailings without loss of stock since it all goes through the Dirtecs and the Save-all. The fibre content of the Save-all feed is increased and this steps up recovery efficiency. Test sheets of the residue from the Dirtecs show that it is taking out not only the heavy dirt but the shives and grease, both of which are present in considerable quantity in this particular stock.

Another mill had a problem with rope stock. They had a whole rotary boiler full of rope that had been cooked but which they couldn't use because of a greasy black graphite in the rope. It was finally decided to run this stock out as wet broke, passing it through a Dirtec. The stock was then run on the paper machine without any trouble. Here was a practical demonstration of the Dirtec's ability to remove difficult dirt that nearly paid for the installation from this one batch.

• PAPER—WOODPULP •

EXPORT **IMPORT**

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ELOF HANSSON INC.

NEW YORK, U. S. A.

220 EAST 42ND STREET NEW YORK 17, N. Y.

The Jones Composite

By C. H. Vickery, Sales Manager, E. D. Jones & Sons Company

The Jones Composite is a conical machine of advanced design and accurate construction with built-in motor drive. It has been created to give papermaking fibers the particular qualities desired in order to form practically any type of paper.

The usual words "refiner" or "jordan" are not used in connection with the designation Composite simply because there is a belief prevalent among papermakers that "refiner" refers to a machine for brushing or fibrillating fibers while "jordan" is incorrectly presumed to have the same meaning as cutting.

Webster refers to a composite as "a combination or an object designed or constructed to serve more than one use or function." He further says that "composite suggests an object made by combining different, sometimes heterogeneous parts." The Jones Composite will refine, fibrillate or cut papermaking fibers. It will produce intensive fibrillation with a minimum of cutting or intensive cutting with almost no fibre development. Combinations of both actions in varying percentages may also be secured. Mechanically, the Jones Composite is a rugged, precise machine with the driving motor an integral part of the unit. Thus, we have a machine, that, to repeat Webster, "serves more than one use or function and is an object made by combining different parts."

The Jones Composite is not strictly a new machine. Its development can be traced back to the year 1931. During that year our company designed and constructed the first units of the well-known Jones No. 1 high speed refiner or jordan. (See Figure 1) These first machines were created solely to serve the low tonnage facial and tissue machines.

Mills making other grades of paper became interested and with study and the adaptation of various tackle arrangements the results produced by this little refiner or jordan became more and more impressive. It was soon apparent that a better and more efficient machine had arrived.

It was necessary to mechanically strengthen the No. 1 unit because initially it was driven by a 30 HP 1200-RPM motor and greatly increased volumes of stock could be treated more efficiently by tackle arrangements absorbing 50, 60 and even 75 horsepower.

Today, we find this thoroughly proved and increasingly popular No. 1 refiner or jordan becoming standard and exclusive equipment in more and more mills. It has replaced larger jordans with improvement in sheet formation and substantial power savings with better control of results. Installations and applications are too numerous to cover now, but it is safe to say, with the exception of rag felt papers, there is no grade of paper that is not touched by the Jones No. 1.

Before the recent war, some large jordans were rebuilt for processing nitro-cellulose. (See Figure 2.) The rebuilding greatly increased the rigidity and accuracy and motors were combined as an integral part of the jordans. The motor shafts were made hollow and hex-shaped inside to receive the hex-shaped end of the plug shaft. Radial load is carried by the motor bearings and plug adjustment accommodated by a sliding hexagon fit. A very accurate plug adjusting mechanism with a built-in pressure indicator was incorporated. The improvement in results was startling and reaffirmed the value of mass, rigidity, balance, accuracy and preciseness of control already demonstrated by the Jones No. 1.

Sometime later it became obvious that the combining of these two interesting machines into a completely new unit must be accomplished. The Jones Composite was thus conceived and after much intermittent work during the war years, was finally placed in operation during 1946. Figure 3 shows the exterior of the Jones Composite. The length over-all is ten feet with an overall height of forty-one inches and width of forty-eight inches. The exterior is neat and free from unnecessary projects.

The Composite is a completely self-contained machine, built and shipped in one unit including the main driving motor. It may be set upon a prepared or temporary foundation according to the mill requirements and it is only necessary to attach the electrical leads and the stock inlet and outlet piping.

The main body is a heavy one-piece semi-steel casting, machined at the bottom so that it may be placed squarely on the foundation. This casting is bored at one setting to receive the large end bearing support, the shell lining, the motor quill bearings and motor stator. The thrust guide is a one-piece casting bored and recessed to fit the main body casting and bored for the bearing to fit at the same time. The head is sheet stainless steel.

The plug rotor is a heat treated steel forging, integral with the shaft. The taper is ground to receive the sleeve type filling. The motor end of the shaft

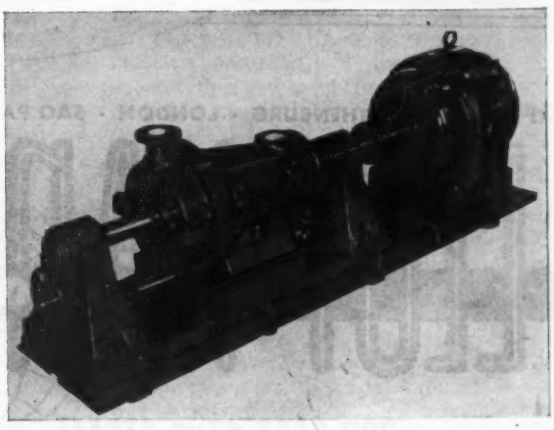

FIG. 1

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

Colors for Kraft

Du Pont Quinoline Yellow Concentrated
Du Pont Brilliant Paper Yellow Extra Concentrated 125%
Du Pont Brilliant Crocein FL Extra Concentrated
Du Pont Anthraquinone Blue BN
Du Pont Nigrosine WSB Concentrated Powder
Pontamine* Fast Red 8BL Concentrated 125%

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A wide range of shades . . . these colors for Kraft can be used singly or in combination with one another.

Good working properties . . . excellent solubility and dispersibility . . . proper light fastness. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.

Du Pont Dyestuffs

DUPONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

is machined hex shape for a sliding fit in the motor quill. The large end of the rotor is protected by a stainless steel plate, fastened permanently in place, and at the small end a stainless threaded nut protects the rotor and locks the plug liner in place. Stainless sleeves are shrunk on to the shaft at both ends of the rotor.

The motor bearings consist of one straight roller and one ball bearing, both mounted in the main body casting and carrying the motor quill. The plug may be removed without disturbing these bearings. The Meehanite motor quill is carried by the motor bearings. It is hollow and hexagonal inside for a part of its length to receive the hex-shaped plug shaft and drive as well as position the latter. The outside end of the motor quill carries the motor rotor.

Thrust bearings are double radial and double thrust combinations with straight rollers, placed on the shaft with a light shrink fit and a sliding fit in housing.

The housing is cast iron, cylindrical on the outside, concentric with the bore, with a keyway to engage with the key sunk in the thrust guide to prevent rotation. This bearing remains on the shaft when removing the plug or changing fillings.

The Composite adjustment is accomplished by moving the plug within the shell, by means of an eight-inch handwheel. The handwheel shaft is geared to the adjusting screw with a four to one spur reduction. The adjusting screw is a ball bearing type with nut built into the thrust bearing and cover, and is lubricated from the bearing. A positive locking clamp is on the handwheel shaft. A machined pad is on the bottom of the thrust guide for applying a small gear motor which in turn may be chain driven to the adjusting screw so that remote control of the plug settings may be secured.

The lubricating system is a self-contained unit mounted in the main casing underneath the shell and consists of a tank of approximately 10 gallons capacity, a pump and filters.

Filtered oil is pumped to the main bearings and returned by gravity to the supply tank. The electrical connections are arranged so that the main motor will not start without first starting the oil supply pump. The main motor will shut off if the oil pressure fails.

The thrust measuring unit is an electronic device which indicates and records actual thrust in pounds. The recorder may be mounted at any convenient place in the mill and is connected by a suitable electrical conduit to a cell mounted on the same axis as the adjusting screw which is made to bear against this cell. The principle of operation is the measurement of the electrical resistance of small wires attached to a column in the cell. The resistance changes in proportion to the load applied. This is made to register on the chart with a range of zero to 5000 pounds.

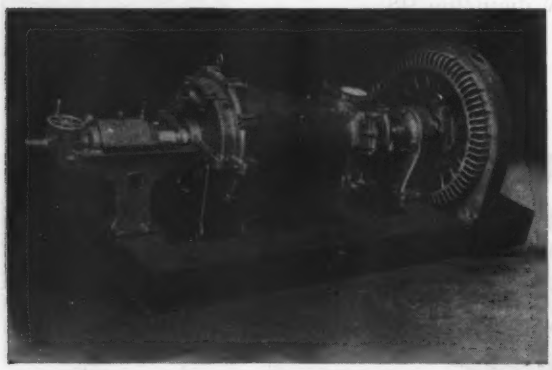

FIG. 2

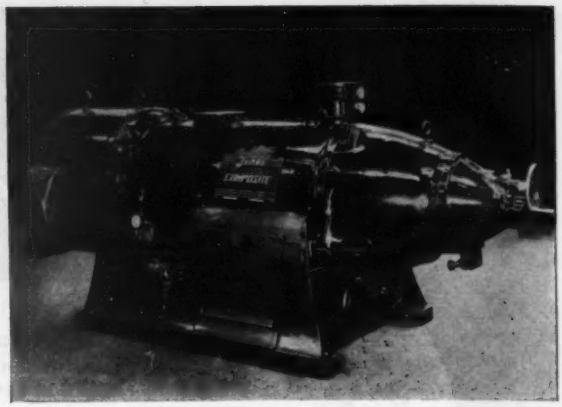

FIG. 3

The driving motor consists of three principal parts, manufactured by Reliance Electric: a rotor which is bored to a taper fit and keywayed to the quill; a stator which is assembled as a one-piece unit and attached to the main casing by 4 socket head cap screws; a splash-proof end shield. The assembly of the motor is such that either the stator or rotor may be readily removed or both may be removed and exchanged for corresponding pieces with different electrical characteristics.

Motors range from 720 RPM to 1200 RPM and from 75 HP to 200 HP. All combinations are completely interchangeable and vary only as to actual electrical construction.

The working elements or tackle of the Composite vary greatly, depending on the type of stock preparation required. In all cases bar patterns are machined from solid stainless forgings and wooden filler pieces are non-existent. The one-piece machined stainless plug and shell liners are precisely ground inside and outside and fit correctly when assembled in the Composite. There is no sanding or grinding operation required and a newly refilled Composite may be put to work immediately.

Complete tackle changes may be made in less than one hour, making it feasible to alter the stock treating characteristics for different grades of paper. This is considered of great importance because it permits greater flexibility and control of fibre development on the part of the paper maker.

Initial operation of the Composites has been primarily concerned with mechanical characteristics. Several units are in actual mill operation and have proved to be sound in these important factors.

The aims of the Composite program are to give the paper maker a standardized machine of extreme accuracy and rigidity, with ease of maintenance and the ability to prepare all kinds of stock at the lowest cost for power and maintenance.

Sufficient performance data is not available for discussion at this time, but it can be said that early results are impressive and indicate that the aims will be fully met.

PULP

Perkins-Goodwin Co.

ESTABLISHED 1846

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CHICAGO, ILLINOIS

LUFKIN, TEXAS

STOCKHOLM, SWEDEN

PAPER

Some Facts And Thoughts About Woodroom Equipment

By N. P. Wardwell, Carthage Machine Company

There are about 157 mills in this country and 60 more in Canada that use chippers. Of these mills, 65 in the United States and 28 in Canada already have tasted the joy of operating a "multiknife chipper" by which we mean "one that puts two cuts at a time in most of the logs." There may be more. But this figure is at least not too high. With so many of you here that have had intimate experience with these machines, I won't be able to get away with all the glowing things I might be tempted to say otherwise. We have had troubles and you have taken them in stride with a wonderful spirit that has helped us immeasurably in making improvements. In spite of troubles these chippers have proved to be highly beneficial. So it is of great importance to the industry that this gospel be spread to the remaining 124 mills.

Here are some testimonials. One sulphite mill that was always very careful of its four-knife chipper, reports $1.30 per ton saving in rejections from pulp screen since changing to a 10-knife chipper.

In this mill the tailings were reduced from an average of 3.8 percent to an average of 2.44 percent over a period of several months. They like to cook as long as possible and still get production, and they were able to increase the length of cook from 7.8 to 8.8 hours.

Another mill gets 10 percent increased sulphite production from its digestors. This is partly due to being able to pack more chips and partly to better yield.

A kraft mill has eliminated chip screens and crushers, cooking the chips as they come from the chipper.

One sulphite mill has eliminated its crusher, using the screens only to eliminate sawdust. They rescreen the sawdust to reclaim the pegs.

We have some good sawdust records: 0.99 percent through ¼-inch mesh as compared with 1.81 percent on four-knife chipper in same mill. Another reports less than 1 percent through ¼-inch mesh. Another reports 1.7 percent through .14-inch mesh. Some mills, however, say sawdust is just the same as before. If anyone says sawdust is worse we look for the cause and usually are able to correct it. There is pretty general agreement that sawdust is reduced. One reason is that the knives cut more without getting dull because they do not get hot. But in general we do not use sawdust reduction as a selling point.

Perhaps to stimulate discussion it might be well to talk about troubles.

The first eight-knife chipper had semi-steel alloy cast iron wearing plates. The wear on these plates was negligible for the first year. We thought wearing plates were unnecessary especially when we put the knives closer together. But we had changed to a steel disc, and we had shaped the spout so as to encourage the logs to lie in the corner next to the bearing. The steel wore faster than the alloy iron plates, and the shape of the spout concentrated the wear at the inside end of the knives. So we had to fall back on wearing plates.

We had thought at first that the steel disc could be built up by welding when worn and ground down to true surface. But we had some scares with the early steel discs that kept us from recommending this method of repair. We are not afraid of welding them now although we have hesitated to apply hard surface rod to this surface. One of our customers did it successfully, however, on a 12-knife disc. Even so the wearing plate method seems easier.

Our steel wearing plates are ⅜-inch thick. If we made them thicker the cutting edge would be that much farther from its firm support. Our later knife holder design has proved that a strong clamp close to the cutting edge prolongs the life of the edge.

The wearing plates have to be machined; so they can't be very hard before machining, and if they are heat treated afterwards they warp. So we have cut short parallel grooves opposite each knife edge and at right angles to it and have welded them full with hard surfacing rod. But the soft steel wore between the strips.

The next step was chrome plating. Very fine results have been reported from Canada resulting from this process. We tried a set in a mill asking them to watch closely and advise us as soon as wear appeared. We did get wear right opposite the knives much sooner than we thought would warrant a replating job. Of course once the plating is gone wear progresses much faster. So now we are trying a combination of a hard surface bead along the edge opposite the knife and chrome plating back of it. We hope this will provide the best answer yet. One point to watch is the heads of the bolts. If they are not flush with the surface of the plate, wear starts right there. The chromium plating shows this up very clearly. Perhaps these heads should also be plated.

Another interesting trouble was in holding plates tight even though clearances was left between them and the knife. Cap screws were used because of the difficulty of putting through bolts in the beveled section. These screws were pinned, but they loosened up from vibration even with fine thread. We tried holding them down by filling in the countersunk holes with welding rod while in place on the disc. But the difficulty of removal brought protests on that, though we did send a welder to one mill who cut out these welds with a carbon rod in a half hour. Now we use through bolts and counterbore the beveled section.

We don't need to talk much about the cast alloy iron wearing plates which we ship with most chippers now because they aren't much trouble. When the edge becomes worn, we believe in grinding it down once to a uniform slope all across the surface opposite the knife. The knives will not need to stick out so far then to get the same length chip. The next time they get worn they can be removed and turned down

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

The vapor that rises from the driers of a paper or board machine represents coal consumed under the boilers. Every extra pound of water squeezed out of the sheets at the press means a pound less to be evaporated . . . less coal to be burned . . . less dollars to go out the ventilators.

The amount of water that can be removed at the press is determined largely by the *appropriateness of the felts* for the job to be done. The wools used in their manufacture must be properly selected and blended . . . size and shape of mesh must be right . . . weaving, shrinking, fulling and finishing must be the work of skilled craftsmen with long experience in their art.

This explains why low cost production attends the use of *correctly selected* Hamilton Felts. Almost a century of experience goes into their manufacture. More than 300 different felts are in the Hamilton line. Each one represents maximum efficiency for the purpose for which it is designed.

• From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

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• Miami Woolen Mills •

Hamilton Felts

• Established 1858 ○

and shimmed up. Then the grinding step can follow again. Then you can get new ones.

Bed Knives

There have been two main troubles with bed knives. They have jumped back under hammering of chipping operation and they have been difficult to change. The bed knife that pulls out at the side is the answer to both these troubles. It lies against a solid backing in a seat that tapers backward so it can't jog forward into harm's way. The spout clamps on top of it and can be raised by jack screws to let the bed knife be pulled out. This idea was the brain child of Charles Johnson, chief engineer of the Brown Company in Berlin, New Hampshire.

The ease of changing the bed knife is important because when it becomes rounded or worn too steep, logs begin to tip up and poor chips result on even the best chipper. This is the heart of the machine and it must be cared for diligently.

Power

We have been criticized for recommending motors with power rating too low for this service. This criticism may be justified on some synchronous motor drives although perhaps sharper knives and a shorter chip might have brought them in line too. But with induction motors, we are sure the troubles come from underflyingwheeling rather than underpowering.

A 24½-inch spout chipper can cut a 23-inch diameter 5-foot log of hardwood in 1¼ seconds. If a 400 h.p. slip ring motor is used, it will slow down about 23 percent. If the power were turned off at full speed and such a stick fed in, the disc would slow down about 30 percent. The flywheel carried the brunt of the peak loads. This motor at 25 percent slowdown supplies 200 percent torque or 1,000 hp seconds. The disc and flywheel supplies 10,000 hp seconds which is all we dare put in on account of a crow bar might go in and the wreck would be worse. The 23-inch x 5-feet hardwood log requires 5,000 hp seconds.

A recent test on a 19-inch spout chipper with a 96-inch 12-knife disc running 360 r.p.m. chipped 66½ cords of southern pine in one hour. A careful integration of the power curve made by using a fast running chart showed 247.7 h.p. hours or 3¾ h.p. hours per short cord. This is the lowest power record we know of. When the rate of feed of this chipper was reduced to 30 cords per hour, the power per cord went up to 6.4. The first 12-knife chipper cut 20 cords per hour of 8-foot poplar with a 100 hp motor. These figures show that the power you need to get normal production is not high. So if you have power troubles, ask us to figure what your flywheel should be.

Layout

As you know our spouts tip over sidewise so that the vertical centerline of the opening adjacent to the disc is about 22 degrees to the vertical. This makes it possible to use shorter knives and still cover a given size spout opening. But it does bring up a problem of layout. One mill with chipper shaft at right angles to the feed conveyor and a 16-inch spout complains of considerable trouble with jams. They had a seven-chain conveyor with two men feeding, and it was the hardest job in the mill. They have since installed a second chipper with a 19-inch spout and set the spout right in line with the conveyor. The attendant has practically nothing to do and they are getting capacities up around 50 cords per hour.

Another mill has a 4-knife 19-inch spout chipper for cat faces with shaft parallel to the conveyor and a 10- knife 19-inch spout chipper with shaft at right angles to the conveyor. The chutes to the two chippers converge in an air operated baffle which directs the flow of logs to the 10-knife chipper except when a catface comes along. The change of direction seems to do no harm in this installation.

We think the important point to watch is to have the spout at the end of the conveyor.

This brings up the thought thati t is highly desirable to have a spare chipper so located that it is no trouble at all to change over from one to the other. If a set of knives get nicked, the usual practice would be to continue without stopping till the end of the shift. In two hours you might chip 80 cords and might get 4 percent sawdust and slivers as a result. If wood costs $14 a cord in the south at the chipper that would mean a loss of $45 or about double in the north. Losses like this or of similar nature occur often enough so that it would not take very long to pay for a chipper. The men who change knives would be less hurried and could do a better job in keeping close to the bed knife, and the results would be very much increased efficiency.

From the standpoint of interchangeability of parts it is best to have both chippers the same hand. This makes a funny looking layout with shafts pointing in odd angles. But that does no harm and it will get the results of easy feeding and easy changeover.

Barking Drums

Our drum is made from 6 plates 1-inch or 1⅛-inch thick and 40 feet long. They lie lengthwise inside heavy trunnion rings and reinforcing rings to which they are welded. The drive is accomplished through a ring gear of cast alloy iron.

We believe that plates are the ideal medium to withstand the terrific pounding to which all drums are subjected.

The bark breaks up and escapes through 2½-inch spaces between the plates.

The smooth surface except for the 6 lengthwise round bars that we weld inside for lifters, reduces the amount of brooming.

Chip Screens

We build the Dillon chip screen which is a Canadian design. The tray hangs from spring supports from above. Its only two bearings are located in the walls of the tray assembly. They are 3/32-inch off center from the pulley and balance wheels. When the screen starts up the center of the pulleys wobble. When full speed is reached, the center of pulleys is steady and tray vibrates.

This makes it possible to run at 1,000 r.p.m. without any damage to the machine from vibration. People who watch it are astonished at its freedom from vibration. A 3-hp motor is more than enough to run a 6 x 14 triple deck screen. The waste energy dissipated in vibrating the floor is very low.

The high speed and circle throw motion makes for good screening and helps materially to keep the sawdust mesh free from pegs.

Rechippers

We recommend a 34-inch diameter 10-knife chipper with a steel disc and a V shape spout for cutting up slivers. The V shape spout straightens out the slivers and so they get cut across the grain. It doesn't work 100 percent, but it performs very satisfactorily.

INTERESTING FACTS ABOUT PAPER

The Moors who overran Spain in the Eighth Century were the first people in Europe to establish a paper industry. Their paper was of the *Oriental* type, possessing great strength and durability.

INTERESTING FACTS ABOUT GREEN MX CONC.

Green MX Conc. is one of the strongest tinctorial basic colors. Possessing little light fastness but great strength and brilliancy, it is often used to brighten direct and acid colors. It is extensively used in beater dyed tissues, wrappers, boxboard, poster, news, catalog and specialties—in short, wherever an economical green is required.

Your Calco representative will be glad to supply you with full information on Green MX Conc.

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Turbine Deposits

Presented by L. A. Burkhardt, Allis-Chalmers Manufacturing Company

For the past six years the Water Conditioning Department of Allis-Chalmers Manufacturing Company has been employing x-ray diffraction techniques in the study of steam turbine blade deposits. X-ray diffraction techniques indicate the exact composition of the material present in such deposits. Chemical analyses may lead to erroneous conclusions with regard to the composition of such deposits. For example, sodium hydroxide and sodium carbonate have frequently been reported as present in turbine blade deposits, whereas our study has as yet failed to show a single sample containing these materials. Chemical analyses also fail to distinguish between the several forms of silica which are found to occur in turbine deposits.

Deposits occuring in steam turbines may be conveniently classified as follows:

(1) Corrosion or erosion material

(2) Water insoluble compounds of calcium and magnesium

(3) Silica, silicates, and water soluble compounds

Corrosion and erosion deposits consist primarily of metallic oxides and occasionally sulfide. Magnetite (Fe_3O4) and hematite (Fe_2O_3) are found to predominate in this group. The second class of materials contain compounds such as calcium carbonate, calcium phosphate, and magnesium hydroxide. These materials are frequently found associated with oily materials. This association suggests that the adherence of these materials to turbine blades requires the presence of some adhesive material. The third class of materials, made up of the several forms of silica together with the silicates and compounds such as sodium chloride and sodium sulfates, has been the major concern of the present studies of turbine blade deposits.

The obesrvation that the siliceous materials in the third class of turbine deposits tended to occur in sequence in such deposits led to an investigation of the composition of turbine blade deposits with regard to the temperature at the point of occurrence of such deposits. As data accumulated, temperature relations were definitely shown among the various components of the turbine blade deposits.

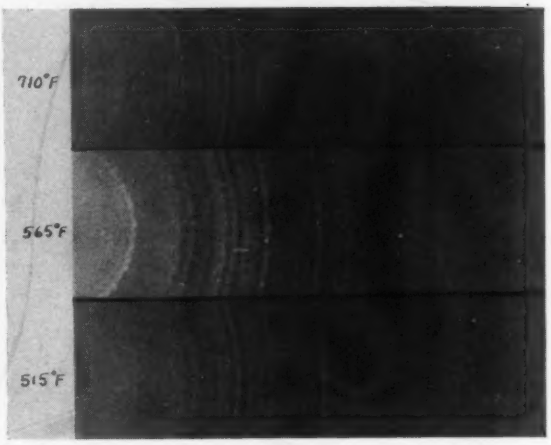

FIG. 1
Sequences in Turbine Deposits

It was decided to expand the scope of the project by seeking data on the relation of the composition of turbine deposits not only with temeprature at the point of occurrence, but also with the boiler pressure of the boiler producing the steam from which these deposits had been derived and also with the boiler water from such boilers. In order to aid in the accumulation of samples and data, operators of turbines operating at throttle pressures of 350 lbs or more were invited to submit samples together with the necessary data for study. In return for such cooperation the results revealed by our x-ray examination have been sent to the cooperating plants.

To date over 200 samples from 27 power plants have been studied. To suit the purpose of this study, it is necessary that samples be obtained from individual rows rather than composite samples. It is also necessary that samples be taken from each row showing any deposit. Fortunately, x-ray diffraction techniques require very small samples, less than a tenth of a gram being required for this purpose. Where possible, we prefer to obtain considerably larger samples so that other studies may be made on the deposit.

Table I indicates the compounds thus far found to be present in turbine blade deposits of the third class. The range of temperature across which the individual compounds have been found is shown together with the average temperature of occurrence of the samples thus far studied. From the percentage of occurrence it is readily seen that four compounds make up the majority of the deposits observed. Three of these four, alpha quartz, beta sodium disilicate, and amorphous silica are all siliceous materials. The fourth member of this group is sodium chloride. Silica in one form or another has been found to occur in 90% of the samples thus far studied. The necessity for the control of silica in the prevention of turbine blade deposits is, therefore, readily seen.

Variation in Crystal Size of Sodium Disilicate with Temperature

TABLE I—OCCURRENCE DATA ON COMPOUNDS FOUND

Compound	Formula	Temperature Range °F.	Average Temperature of Locations Where Found	Number of Occurrences	Percent
Alpha Quartz	SiO_2	200-550	358	69	34.6
Beta Sodium Disilicate	$Na_2Si_2O_5$	419-710	546	51	25.6
Amorphous Silica ..	SiO_2	120-490	274	48	24.1
Solium Chloride ..	NaCl	200-700	512	44	22.1
Cristoballite	SiO_2	174-360	270	11	5.5
Sodium Sulfate III	Na_2SO_4	625-700	673	9	4.5
Sodium Sulfate V .	Na_2SO_4	564-631	604	9	4.5
Acmite	$Na_2O \cdot Fe_2O_3 \cdot 4SiO_2$	410-744	549	8	4.0
Burkeite	$Na_2CO_3 \cdot 2Na_2SO_4$	360-700	587	7	3.5
Sodium Metasilicate	Na_2SiO_3	535-700	613	5	2.5
Unidentified				23	11.6

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

Here's a combination that gives . . .

INCREASED BAG PRODUCTION

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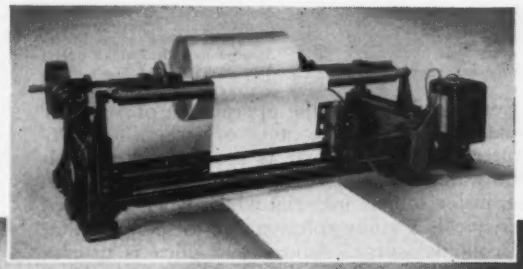

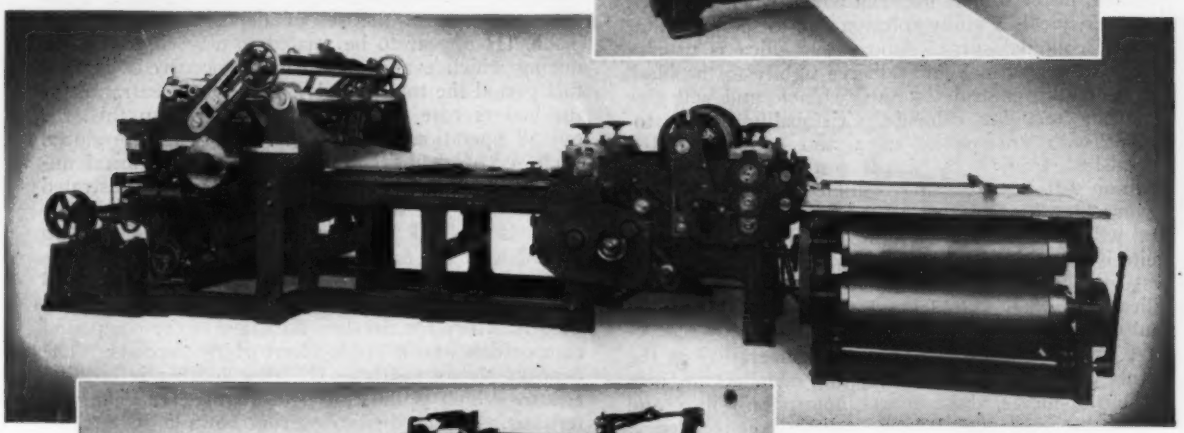

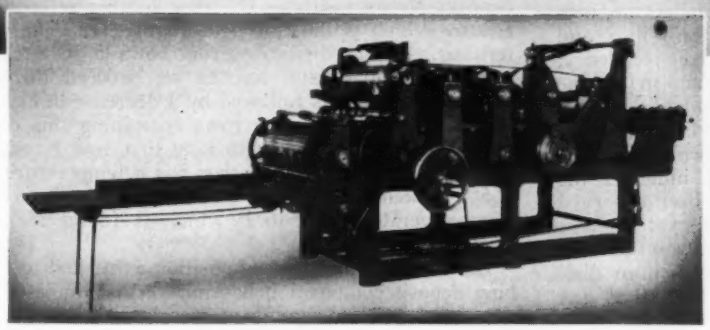

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TABLE II—COMPOSITION OF TURBINE DEPOSITS FROM A TURBINE OPERATING AT 850 LB. THROTTLE PRESSURE, 900°F. THROTTLE TEMPERATURE

Stage	Temperature, °F.	Composition
10 stationary	454	Sodium disilicate
10 moving	454	Sodium disilicate
11 stationary	419	Sodium disilicate
11 moving	419	Sodium disilicate, alpha quartz
12 stationary	376	Alpha quartz
12 moving	376	Alpha quartz
13 stationary	337	Alpha quartz
13 moving	337	Alpha quartz
14 stationary	298	Alpha quartz
14 moving	298	Alpha quartz
15 stationary	261	Alpha quartz, amorphous silica
15 moving	261	Amorphous silica, alpha quartz
16 stationary	227	Amorphous silica, alpha quartz
16 moving	227	Amorphous silica

A brief description of the appearance of some of these materials and simple notes of recognition may be of interest. Alpha quartz is usually well crystallized and water insoluble. Beta sodium disilicate is an alkaline, water soluble material which when dissolved in water, yields a milky solution due to the precipitation of colloidal silica. Amorphous silica is usually glassy in appearance and adheres tightly to the blading. Sodium chloride is water soluble and will give a strong test for chloride. Cristobalite occurs together with amorphous silica and cannot be distinguished from it by simple test. Both forms of sodium sulfate are water soluble and will yield a strong test for sulfate. Acmite is water insoluble and will be difficult to recognize by simple test. Burkeite is water soluble, alkaline and will give a strong test for both carbonates and sulfates. Sodium metasilicate is water soluble and very strongly alkaline and will dissolve completely in water.

A consideration of the average temperature at the points where the compound sodium metalsilicate, beta sodium disilicate, alpha quartz, amorphous silica, and cristobalite are found, will indicate the tendency, of these compounds to occur in sequence in turbine deposits. Sodium metasilicate is found to have an average temperature of 613°F., beta sodium disilicate 546°F., alpha quartz 368°F., amorphous silica 274°F., cristobalite 270°F. Figure I indicates the sequences of these materials that have been observed in various series of turbine deposits. As yet we have not observed the complete series from any one set of turbine deposits. The combination sodium disilicate, quartz, and amorphous silica has thus far been most common.

Tables II and III illustrate two sets of deposits which show many of the features found in our turbine study so far. Both sets of deposits were taken from the same turbine. The deposits in Table III were obtained after two years operation subsequent to the deposits shown in Table II. The sequence sodium disilicate, quartz, and amorphous silica is shown by both sets of samples. An interesting point in the set of deposits in Table II is the distribution of sodium disilicate and alpha quartz in the 11th stationary and 11th moving stages. A similar situation occurs in the distribution of alpha quartz and

TABLE III—COMPOSITION OF TURBINE DEPOSITS FROM A TURBINE OPERATING AT 850 LB. THROTTLE PRESSURE, 900° F. THROTTLE TEMPERATURE

Row	Temperature, °F.	Composition
5	710	Beta sodium disilicate, sodium sulphate III
6	665	Beta sodium disilicate, sodium sulphate III
7	616	Beta sodium disilicate, sodium chloride
8	565	Beta sodium disilicate, sodium chloride
9	515	Beta sodium disilicate, sodium chloride
10	454	Beta sodium disilicate, sodium chloride
11	419	Quartz, sodium chloride, beta sodium disilicate
12	376	Quartz, sodium chloride
13	337	Quartz, sodium chloride, amorphous silica
14	295	Amorphous silica, quartz, cristobalite
15	261	Amorphous silica, cristobalite, quartz
16	227	Amorphous silica, cristobalite
17	198	Amorphous silica, cristobalite
18	174	Amorphous silica, cristobalite

TABLE IV.—CHEMICAL ANALYSES OF DEPOSITS SHOWN IN TABLE III

Row	Sodium Oxide (Alkalinity), %	Total Silica, %	Soluble Silica, %	Sodium Chloride, %	Sodium Sulphate, %
5	24.1	43.1	21	...	29.1
6	27.8	46.4	20	...	3.9
7	31.5	46.8	24	4.0	...
8	29.5	54.2	40	19.0	...
9	29.8	49.7	32	27.6	...
10	19.1	38.8	25	43.5	...
11	5.5	75.5	16	19.0	...
12	1.7	94.9	4	4.0	...
13	1.2	97.3	3	3.0	...
14	...	96.8	..	...	...
15	...	96.1	..	...	...
16	...	94.6	..	...	...
17	...	95.5	..	...	...
18	...	92.8	..	...	...

amorphous silica in the 15th stationary and moving stages. In both cases the change in composition of the deposit across stationary and moving elements is the same. The occurance of sodium sulfate and sodium chloride in the set of deposits illustrated in Table III appear to be related to a weeks operation during which evaporator priming occurred During this period the total dissolved solids concentration of the boilers rose considerably. Other than this, the overall operation during both runs, which produced each set of deposits, was the same. Chemical analyses of the deposits found in the series illustrated in Table III are shown in Table IV. A point of interest is the lack of sodium oxide to silica ratio in accord with the finding of sodium disilicate in rows 5 to 10. This condition is frequently encountered and is one of the reasons that chemical analyses are unsatisfactory for the determination of the compound composition of materials like turbine deposits. The deposits shown in Table III have another interesting feature which is illustrated in Figure II. The patterns of sodium disilicate from rows 5 to 8 show an increase in crystal size as we proceed through these rows. This is followed by a decrease in crystal size across the remaining rows containing this component. It is interesting to note that row 8, which shows a maximum crystal size, has a temperature of 565°F which corresponds quite closely to the average temperature of 546°F which is found for sodium disilicate.

Data on boiler water composition as related to turbine deposit composition has not yet accumulated to the point where significant conclusions might be drawn from such data. A summary of the relations so far found between boiler pressures and turbine deposit composition is shown in Table V. It may be noted that the siliceous materials sodium disilicate, quartz, and amorphous silica have thus far shown the widest range of occurrence with regard to boiler pressure.

TABLE V.—COMPARISON OF COMPOUNDS FOUND IN TURBINE BLADE DEPOSITS WITH BOILER OPERATING PRESSURES

Compound	Boiler Pressure Range, lb./sq. in.	Average Boiler Pressure, lb./sq. in.
Sodium Chloride	300-600	409
Sodium Sulphate III	300-550	450
Sodium Metasilicate	400-550	460
Burkeite	360-900	502
Sodium Disilicate	400-1200	692
Sodium Sulphate V	400-900	730
Amorphous Silica	350-1325	980
Quartz	350-1325	1012
Acmite	1200-1250	1237

FIG. 1
COMBINATIONS OBSERVED IN THE SODIUM-SILICATE-SILICA SEQUENCE IN BLADE DEPOSITS

Metasilicate—Disilicate
Metasilicate—Quartz—Amorphous Silica
Disilicate—Quartz—Amorphous Silica and Cristobalite.
Disilicate—Quartz—Amorphous Silica
Quartz—Amorphous Silica and Cristobalite.
Quartz—Amorphous Silica

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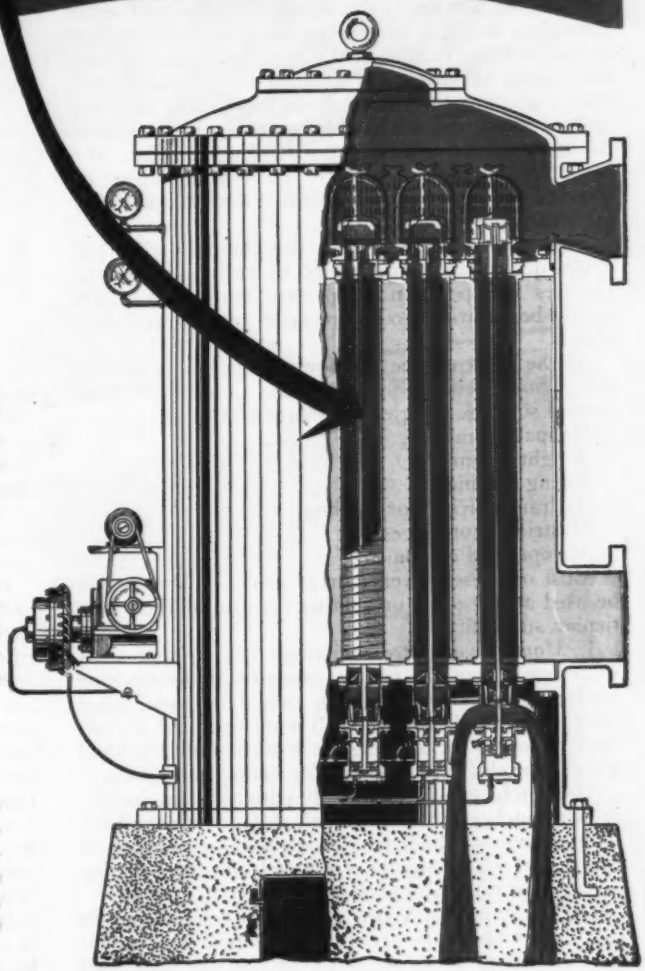

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Modern Air Operated Devices for Paper Machines

By Fred R. Erbach, Beloit Machine Company

The continual demand for increased speed with less down time has accelerated the development of many detailed refinements in paper machines. These refinements pertain to the numerous large and small individual devices requiring power application throughout the machine. We have been energetically developing various units to meet this demand. We have made a careful analysis of the factors involved and for some time we have been greatly impressed by the many operating advantages of compressed air. We are therefore pleased to give you a brief outline of some of the important air operated devices used on a modern paper machine.

Before proceeding with a description of air operated devices I should like first to outline some of the features of operation on present equipment which should be improved to secure safer running at higher speeds.

At the present time the power required to operate the various devices on a machine is obtained from several sources. In brief these are:

Manual operations,
Weight loading,
Spring loading,
Hydraulic drives or loading,
Electric motor drives,
Air operated equipment.

Most of these power sources probably always will be used at one point or another because of their particular suitability.

1. *Manually operated* equipment not only represents work but it may call for the presence of the machine tender at one point when he should be some other place. We are all familar with hand operated devices such as levers for shifting mechanical clutches, hand wheels for shifting belts and for lifting press rolls.

These jobs can be practically eliminated by installing air clutches, air operated belt shifts or air operated lifting devices. Small hand control levers located at convenient places on the front side of the machine provide for rapid and precise control.

2. *Weight levers.* When used on presses, result in a rather cumbersome arrangement which requires individual attention in the front and on the back side of the machine. The weights may not always be accurately applied and there may be a considerable amount of internal friction which will result in unequal loading or improper operation. When heavy weights in the lever system are suddenly moved, they possess a considerable amount of inertia which may cause pounding or jumping to an undesirable extent. When weights are replaced by air loading devices the exact loading is reflected in pressure gauges which provide the operator with a visual measure of the loads actually applied. The internal friction as well as a large amount of the weight in the operating system are greatly reduced. The press loading becomes uniform and can be accurately adjusted to suit operating requirements.

3. *Spring loading,* though desirable in many places, may have certain mechanical disadvantages. For example, springs recoil very rapidly and under some operating conditions this may produce vibration. Air provides a cushion which resists vibration.

4. *Hydraulic cylinders,* when used, provide an opportunity to apply a considerable force. Generally, however, they do not have the resiliency or cushioning characteristics which are frequently necessary for protection when suddenly overloaded.

Air not only provides a cushion due to its compressibility but by using suitable pressure relief devices excessive air pressures may be rapidly relieved to prevent overloading.

5. *Electric motors* are used extensively for the operation of many devices on paper machines and they are very satisfactory. However, due to excessive moisture and corrosive conditions which usually exist on the wet end of a machine, there may be some objection to the use of electric motors in certain locations. Under these conditions it is usually desirable to also eliminate the line of switches, starters, limit switches, reversing switches and the conduits connecting these devices with each other and with their control stations.

6. *Compressed air* as a source of power is expensive to produce, as compared to electric energy. We therefore find that it is used principally for operation of equipment which may not require large air volumes for operation. By far the greatest number of air units are operated at intermittent periods and therefore the actual air suply requirement is very small. There are, however, some continuously operated devices which have so many desirable features that air is used for operation regardless of its cost.

Compressed air is very suitable as a power source, because it can be made to do useful work in several ways by providing for its expansion under controlled conditions. For example, when we expand air in a cylinder, we can obtain straight line motion. If air is allowed to expand in a motor, rotary motion can be obtained. If air is allowed to expand back of a diaphragm a considerable amount of pressure can be produced under conditions requiring very little movement. Before we can use these air operated devices we must provide for their control in operation.

There is a complete series of units which provide for almost any type of air control or pressure regulation which may be required. Briefly, there are control valves which open or close ports, when hand operated. Other control valves may increase or decrease operating pressures. In addition, fixed pressure regulation, relief valves, rotary air seals, pressure operated switches and solenoid operated valves are available for use on air control systems.

Air operated devices are usually very simple and rugged in construction. Materials used are not readily

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affected by water or heat. They can be used almost any place on the machine without damage due to corrosion. As a result of their simplicity these devices are quite free from operating failures and in the event of failure they are easily serviced by paper machine mechanics.

The complete assortment of controls and air operated devices has made it possible to provide positive control of heavy working units, with the minimum of effort on the part of the machine tender or his helpers.

It will now be interesting to describe the method of controlling and using air operated diaphragms, pistons or motors on a paper machine in order to evaluate the advantages derived from their use.

The air operated diaphragm is probably one of the simplest types of units. The diaphragm has been used successfully for clutch operation, press loading and oscillators where short travel is satisfactory.

The air operated clutch can be used with single or multiple discs. The movement of the diaphragm will readily adjust itself to the travel required in the clutch and no extra adjustment is necessary. The clutch is designed to eliminate the transmission of heat from the friction surfaces to the diaphragm. As a result of the large effective area possible, diaphragm clutch operating pressures of 7 to 10 pounds average are usually satisfactory. These low pressures result in very low stresses in the diaphragms. The rotary air seals which provide air to operating machines are not overloaded at these low pressures.

By providing the proper control devices on the supply line to an air operated clutch, it is possible to regulate the pressure built up and thus prevent rapid engagement.

Mechanical drive units using air clutches can be arranged to tie in with electric helper motor drives. When a machine equipped with helper motors is to be started up, the motors are energized before the air clutch is engaged. In the event of a failure in the electric supply circuit the air clutch is immediately disengaged. This kind of protection on a helper drive will avoid damage to felts, wires, rubber covered rolls or mechanical drive parts on the installation. It provides the best possible tie in between a mechanical and an electric helper drive.

The use of air clutches readily lends itself to operation with air brakes. Air brakes are used on drives for large dryer sections, where the inertia of a high speed machine with anti-friction bearings, will permit operation for some period of time after the clutch is disengaged.

Another interesting application using air clutches is on calender stack drives. A control valve may be operated to admit air to the main clutch for driving the calender stack in the forward direction. When it is necessary to reverse the stack, the control valve can be shifted to another position which cuts off the supply of air to the main clutch and admits air to the clutch on the back-up motor drive.

A low output speed gear head reversible motor is arranged to drive the calender stack slowly, either in the forward or in the reverse direction.

A lever control located in a convenient position is all the machine tender needs to disengage the main calender clutch and to engage the reversing drive. The down time to get a plug out of a stack is therefore greatly reduced and the job is much safer to handle.

Press roll loading by means of air operated diaphragms is another very important development. A simple lever is used to multiply the diaphragm force to load the roll. Both front and back ends of the press roll can be loaded from one operating valve. This loading can be identical or if pressure regulators are provided, different pressures may be secured on the front and back sides as required.

Diaphragm operated presses are open and very accessible. The simple lever and diaphragm mechanism greatly reduces internal friction which avoids variation in operation. The compressibility of air provides a cushion effect which is very desirable. Air control permits accurate loading and rapid adjustment.

Both single and double acting air cylinders are used extensively on paper machines. They are simple in construction and are very easy to maintain in good operating condition. One of the most successful developments using air cylinders is the automatic air guide. The front end of the guide roll floats on air. A Witham head on the roll actuates a small slide valve which admits air to the cylinder on which the guide roll is supported. There are no palms, ratchets or continually operating screws on this type of guide. Since the Witham head operates a very light mechanism it is sensitive to slight variations in felt position. The result is a guide which is very easy on the felt and one which requires very little service. The guide operates smoothly and it does not hunt.

Double acting air operated pistons are also used extensively in connection with the operation of the center wind reels and board reels.

On a board reel double acting cylinders are mounted in a vertical position with their lower ends engaging roller levers to hold down the reel spool when it is rolling on top of the drum. Pressure can thus be applied to prevent jumping when a new roll is started. The pistons can recede automatically as the roll of paper increases in size.

After transfer from the primary arms to the incline table a set of double acting pistons provide pressure against the reel spool journals. The hardness of the roll may be controlled by pushing it against the reel drum. Air gauges on the supply lines indicate accurately the pressure provided. The operator can conveniently change the pressure setting to suit the type of sheet board being run.

Where several air controls are used on a reel they are usually arranged in a single panel permitting fast, convenient operation with a minimum of broke.

Double acting cylinders are used on centerwind reels to operate the belt tightener, engage the centerwind clutch and to assist in lifting heavily loaded transfer arms.

Double acting air cylinders are used to provide the reciprocating motion required to drive oscillating doctors and oscillating showers. The device is simple in construction and positive in operation. There are relatively few wearing parts. Air cylinders are also on winder shaft equipment, rider roll lifts; winder shaft lifts, winder gate lifts and winder sheet threaders.

Air motors provide a convenient source of power for various load conditions, such as:

1. Intermittent drives which must have a very high starting torque which can be regulated.
2. Drives which must be frequently or rapidly reversed, with close travel limits.
3. Drives which must move heavy loads very slowly under positive control.
4. Drives which may be stalled for long periods.

Air motors are available with either high speed output shafts or with enclosed gear reduction. These motors are readily reversible by changing the air inlet

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from one port to another. They are also useful on applications where the air motor is detachable and are placed in position for driving only when required.

The amount of power available to start a given load can be greatly increased by merely increasing the air pressure supplied to the air motor. The speed of the motor can be controlled by direct manipulation of the control valve by the operator. Following are several typical applications which clearly bring out the operating conditions on which the air motor drive is an ideal application.

On removable Fourdrinier machines it is necessary to swing the breast roll back in order to provide ample slack in the wire. The breast roll supporting arms have gear segments which can be used to lower the roll or raise it as required. A removable air motor is used to provide the power required.

Air motors are used on Fourdrinier remover drives. The motor is usually mounted directly on the Fourdrinier frame. Flexible connections are used on the air supply hose which may be disconnected when the drive is not required. The control valves are mounted adjacent to the motor so that the operator can start the motor and drive he Fourdrinier across the aisle under his complete control.

On high speed machines of considerable width the main slice becomes very large and heavy. This slice must be operated up or down very slowly and under positive control in order to stop it in exactly the correct position. These slices are provided with vertical lift screws which are driven through worm gear reducers. These reducers are driven by a reversible air motor. It is therefore possible for the operator to inch the slice down into position exactly as required.

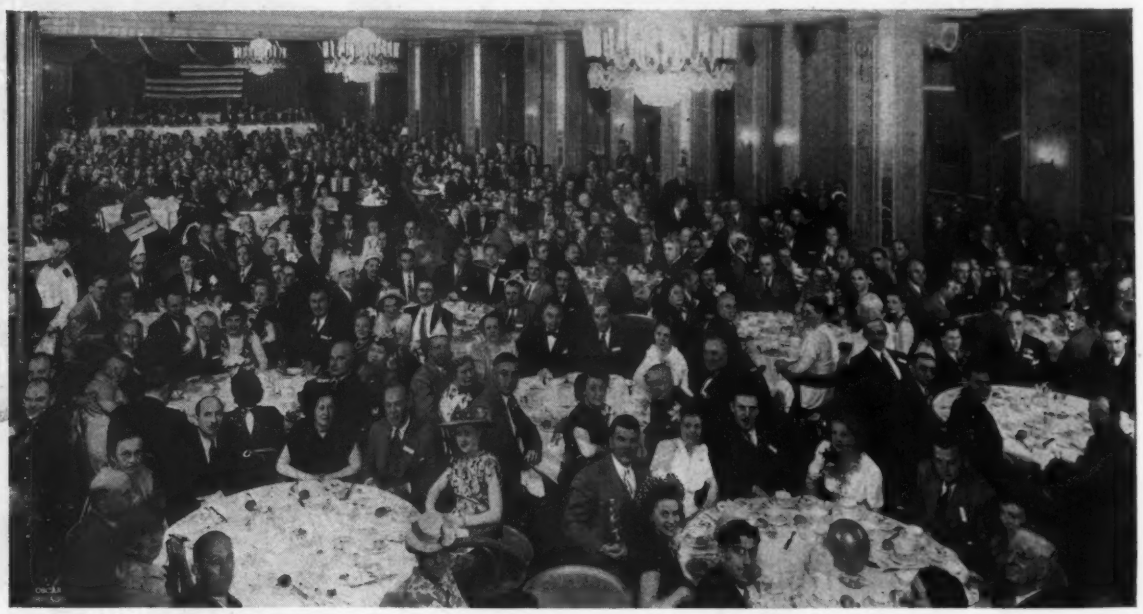
The stock flow to the machine is controlled with large flow regulating valves located in the stock supply pipes. These valves may be opened or closed by driving the valve stem with an air motor. Suitable gear reduction is provided in order to secure slow speed operation. No special devices are required to limit travel in either direction.

The control valves for operating the slice lift and the stream flow valves can be located together in some convenient position on the machine floor. This saves time and gives the machine tender the best opportunity to regulate the stock flow to the wire.

Air motors are also used to drive felt stretchers, belt shifters and press roll lifts. They may be operated from a central control point or from a point near the drive motor.

There are many other special devices that have been used successfully on paper machines but they are too numerous to describe thoroughly at this time.

We hope that this brief description of the applications covered has been sufficiently clear to give you a better understanding of the use of air under pressure on a machine. All of these devices lend themselves to convenient and positive control by the machine operator and therefore their use will be reflected in safer and more continuous machine operation. In the long run this should add up to more tons of paper produced per 24 hours.



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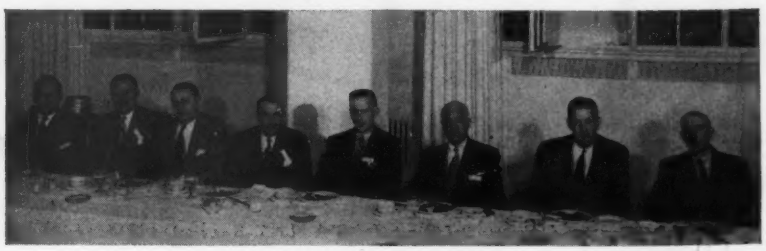

A Group at the Speakers Table (right) at the Affiliates' Dinner

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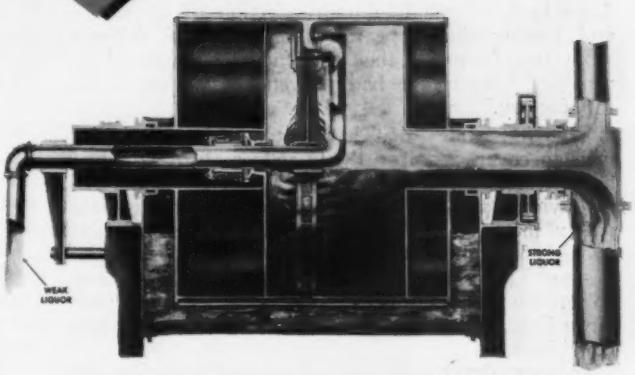

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Study of Dryer Operation to Determine Cause of Failures

By H. M. Spring, Assistant Chief Inspector
Mutual Boiler Insurance Company of Boston

Accidents to dryer rolls come under one of two general classifications. First there are major explosions that may result in injuries or loss of life and great damage to property. The second type of failure is the cracking of some part such as a cast iron head, usually with no further damage.

Major explosions fortunately are not common occurrences, but the potential hazard is far too great to overlook. This possibility is one important reason why the studies this paper briefly describes are rather exhaustive. In fact, they already include investigation of the history and performance of over four thousand dryer rolls.

Cracking of a dryer head sounds insignificant in itself, but the development occurs far too frequently. It invariably means a forced shut-down and costly loss of production.

Brief mention of design and construction is made before considering further the actual failures. While some steel jacketed dryer rolls have been built—most of them quite recently—by far the largest number in service are of cast iron because of the greater surface hardness and ease of casting iron into desired shapes.

A cylindrical shell presents no special problem in design since stresses and safe pressures can be calculated readily. The heads and their influence, however, cannot be so checked by mathematical formulae. The so-called experience of a few manufacturers dates back to rule-of-thumb selection of a pattern and casting that appeared substantial. If failures were not frequent, the manufacturer appeared to consider "experience had proven the design to be satisfactory."

The few states that have expanded their boiler laws to cover cast iron dryer rolls require a hydrostatic test to destruction of a full sized dryer. Then by dividing the bursting pressure by an appropriate safety factor, a maximum allowable pressure is approved for other dryers of like material, size and design. There are but few designs that have been so proven; furthermore, a test to destruction may mean little regarding the stresses set up by operating conditions.

In most dryer rolls, each head and trunnion are an integral casting bolted to the shell. The heads are frequently reinforced with cast-in-ribs on the inside, adding to the complexity of stresses and difficulties in their calculations.

With this outline of accidents and design, let's look at Figure 1 for an analysis of the problem. It has been our experience that failures occur more frequently at the drive end of the roll. Possibly this is explained by thinking of maximum torque or turning force from the driving gear. It seems also to tie in with certain operating faults, one of which leads to vibration by worn gear teeth. Temperature stresses during warm up periods may be much greater at the drive end where steam is admitted.

Failures that are more often at the wet end of the machine appear influenced by the greater temperature differential resulting from comparatively cold, wet paper coming in contact with the hot dryer shell.

Regarding basic causes, detailed discussion on foundry practice is beyond the scope of this meeting. Design problems will be mentioned only briefly to tie-in with the special tests we are conducting. Mention of specific operating faults will be made last with the hope that it may bring out discussion of benefit to all.

In Figure 2 you will see the center of a dryer head from which the trunnion has broken off. The broken trunnion is shown in Figure 3. One very important feature of dryer head design is the effect of a sharp corner rather than a long radius fillet or curve to gradually change the shape. The sharp corner acts as a notch to set up a high concentration of stresses, and it invites cracking or breaking. The failure in Figure 3 started at just such a sharp corner.

Breakage of a felt roll originating in a sharp corner is illustrated by Figure 4. The helical shaped fracture is typical of fatigue influenced by torsional or twisting stress.

In an effort to demonstrate further the cause of cracking in dryer heads, the cracked head in Figure 5 was drilled with a series of holes across its diameter and the head was broken over a short length of steel beam. The crack may be seen with its origin at a sharp corner near the handhole. Revealed also by the fracture is a great amount of slag in the casting. Figure 6 shows a close view of the crack and of the slag inclusions, while in Figure 7, which shows the broken trunnion, still more slag is readily apparent. This slag comes from faulty foundry practice, and it is a source of weakness.

In all cases, cracking is invited by sharp corners either between the trunnion and the head or at a man-hole or hand-hole. In Figure 8 another crack at a hand-hole is shown. Attempts were made to stop progress of the crack by drilling and tapping for a bolt at one end and by brazing the defect. The repair

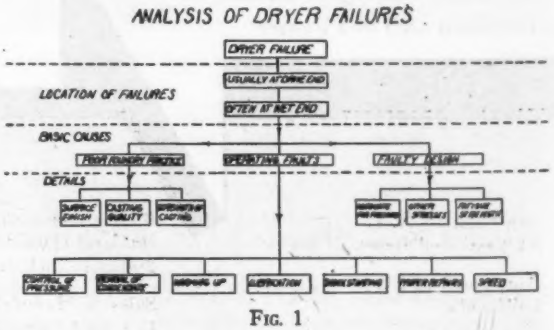

FIG. 1

From an address before the American Pulp and Paper Mill Superintendents Association at Chicago.

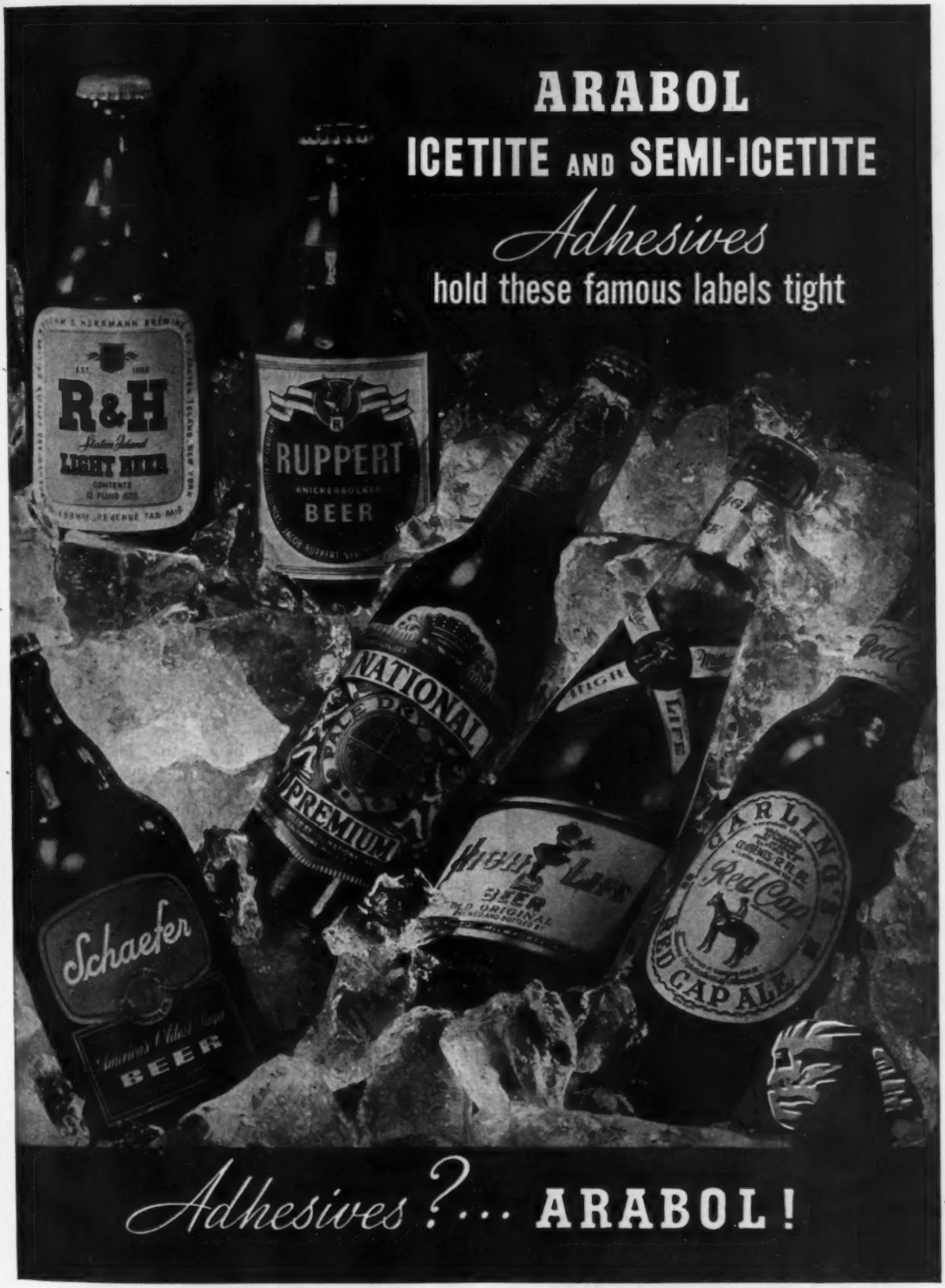

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FIG. 2

FIG. 3

FIG. 4

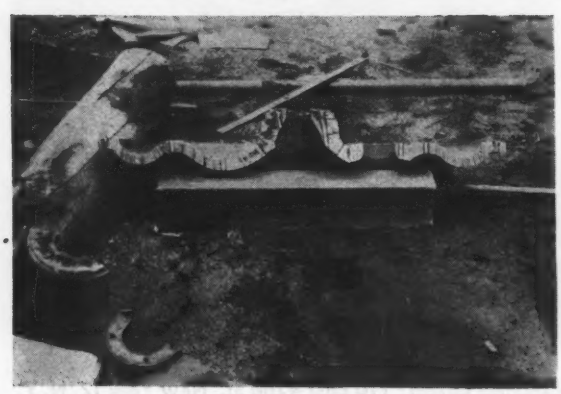


FIG. 5

was not successful and a new head was necessary.

In an effort to locate and measure the stresses that cannot be calculated, we embarked on a program of special testing, using equipment developed during recent years. The first part of each series of tests involved the use of Stresscoat. This is a brittle lacquer supplied in various sensitivities, and the one best suited for prevailing temperatures and humidity is selected. In Figure 9 you will see the Stresscoat being sprayed on the head of a dryer roll set up for the tests. In Figure 10 the piping for admitting pressure of water, compressed air or steam is shown.

The light area of the head in Figure 10 has been covered with the Stresscoat. The purpose of this coating is to show by a crack pattern developed in the Stresscoat by the tests, the location and direction of maximum stresses. The cracks occur, of course, at right angles to the direction of maximum pull. Because of the brittle character of Stresscoat, the cracks in the coating are caused by stresses low enough to avoid any damage to the dryer roll. In order to simulate the worst possible operating condition, the dryer roll was half-filled with water. Pressure was then built up in increments by admitting compressed air. The crack pattern at the bolt circle of the head may be seen in Figure 11.

The next step in the tests is to attach SR-4 strain gauges to permit measurement of any deformation under test pressure. The SR-4 strain gauge consists of a grid of wire accurately drawn to one-thousandth of an inch in diameter. When attached to the surface of a structure by an insulating cement, a controlled current of electricity is passed through the gauge. In the indicating instrument a gauge of like resistance is electrically balanced against the test gauge. As the structure deforms ever so slightly under test pressure, the wire grid elongates and decreases in diameter as it stretches out. With the reduction in diameter, there is an increase in resistance with resulting unbalance at the indicator. The amount of unbalance caused by the test pressure may be read in millionths of an inch.

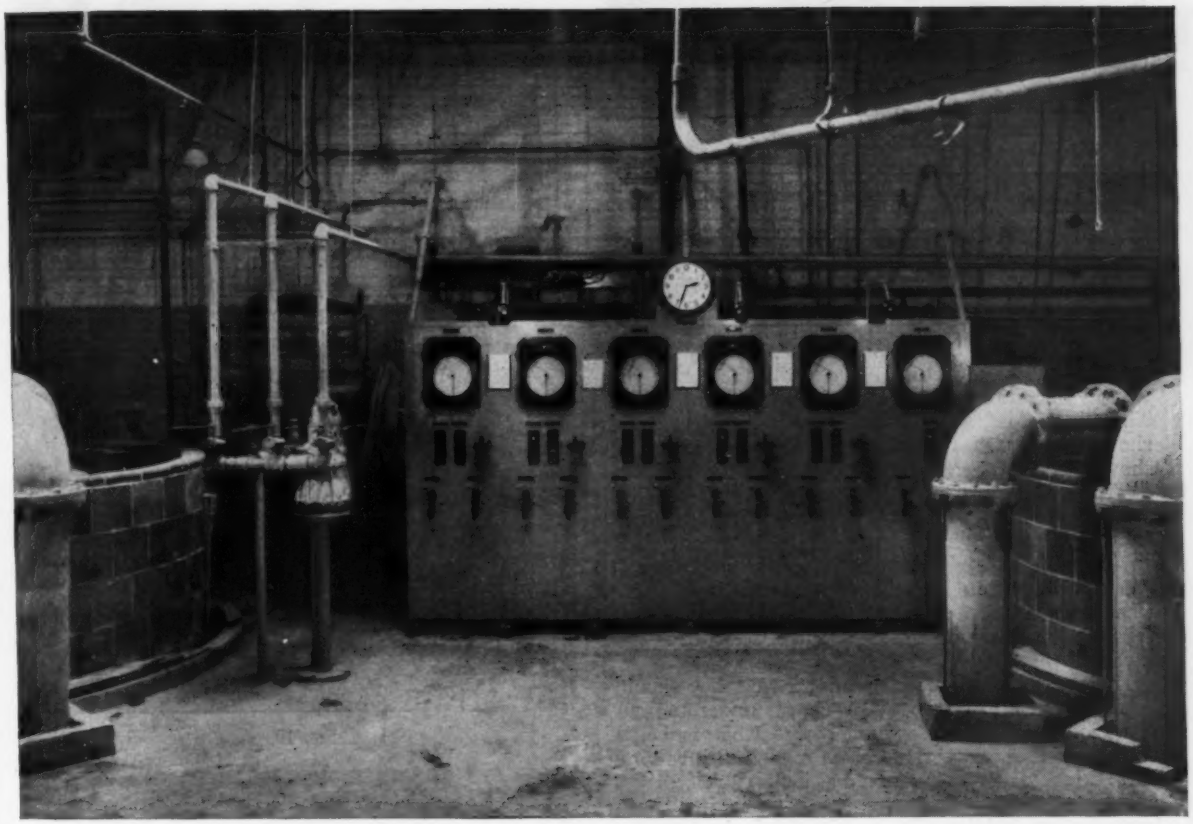
In Figure 12 you will note a clamp improvised to hold an SR-4 strain gauge on the fillet between the trunnion and the head while the cement was drying. In Figure 13 the leads from a rosette of three strain gauges attached to the trunnion fillet through a chipped out section of a shrunk sleeve may be seen.

The dryer roll under static test may be seen in Figure 14 with the strain gauges wired to the indicator. The sling is provided so that the actual stresses due to bending may be measured. This is accomplished first by removing the weight on the trunnions and then permitting full weight to rest on the trunnions. A close-up view of the instruments is shown in Figure 15.

On completing the static or stationary tests, we wished to learn just what additional stresses occurred

FIG. 6

Modernized Mill uses modern stock handling methods



THIS well-known mill, making high class specialties, decided too much valuable time of operators was being wasted. They had to chase all over the operating floor to open and close valves to and from stock processing units. So they installed central panels like this one, from which all of the functions are performed more easily and quickly, releasing operators for more productive work.

The operators can control the inlet and discharge of each unit easily and efficiently from these central control panels. Level Recorders and hand valves facilitate the remote operation of pneumatic cylinder type valves in stock lines to storage chests, cycling tanks, jordans and refiners. Signal lights and switches in connection with the hand-operated valves reduce any chance of human error to the minimum.

Obviously, Taylor couldn't have supplied a system like this without years of experience in applying instruments to the processing problems of the pulp and paper industry. That's why we're confident we can help *you* solve whatever processing problems face you. Ask your Taylor Field Engineer! Or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ontario.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

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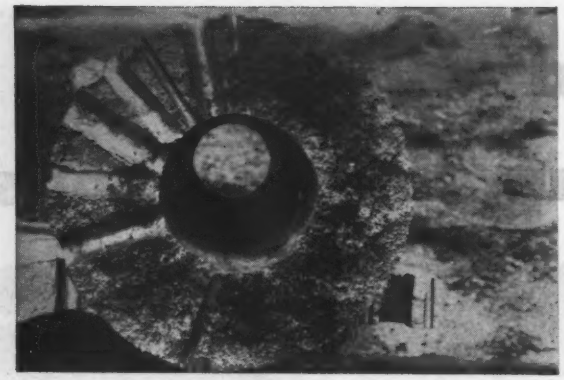

FIG. 7

when the dryer roll was in actual operation. The slip rings and brushes shown by Figure 16 were designed to permit connections between the strain gauges and indicator while the dryer was in operation. Figure 17 shows the strain gauges wired to the phosphor bronze brushes bolted to the head, while in Figure 18 the back of the stationary slip ring assembly may be seen bolted to the machine frame.

Figure 19 is a picture made while the dryer roll was in operation at a speed of 700 ft. per minute. The picture is taken from beneath the dryer and shows the brushes tracking on the slip rings. It shows also a broken wire that concluded the test.

Turning to problems that are the responsibility of the operating personnel, they are; first, the control of pressure. This is exceedingly important since an explosion might result from excessive pressure. All superintendents and their operators should know what maximum pressure is allowed on the dryer rolls, and they should make sure this pressure is not exceeded.

If any repairs are made to a dryer roll, they should be made only by competent workmen under the supervision of one understanding just what is being done. In one recent serious chain explosion involving two 72 inch dryer rolls and a 144 inch Yankee dryer, it is understood from one report that a limited number of bolts holding one of the 72 inch diameter dryer heads to the shell were pulled up very tightly to overcome leakage. If all bolts were not pulled up in equal tension, the eccentric loading might well have resulted in such a failure. While full details of this accident are not immediately available, it was learned from a reliable source that the tensile strength of the dryer involved in the initial failure was less than 55% of that which had been specified.

FIG. 8

The removal of condensate is of importance if excessive bending stresses due to the added weight are to be avoided. Also, excessive stressing of the dryer parts due to temperature changes will be avoided if the condensate is properly removed from the dryer rolls.

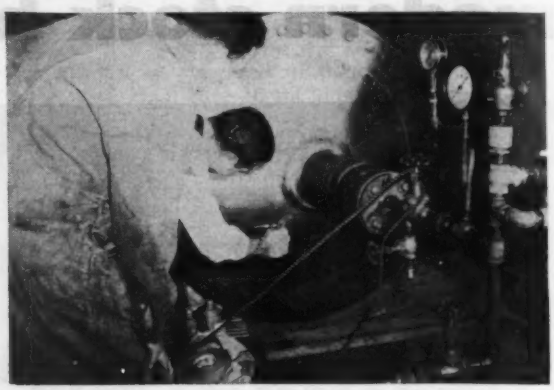

FIG. 9

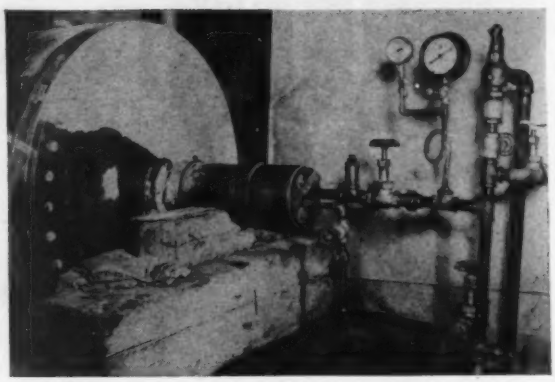

FIG. 10

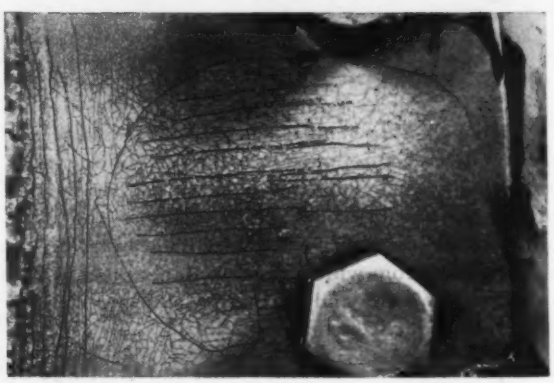

FIG. 11

FIG. 12

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ROLL SHAFTS ARE ELIMINATED

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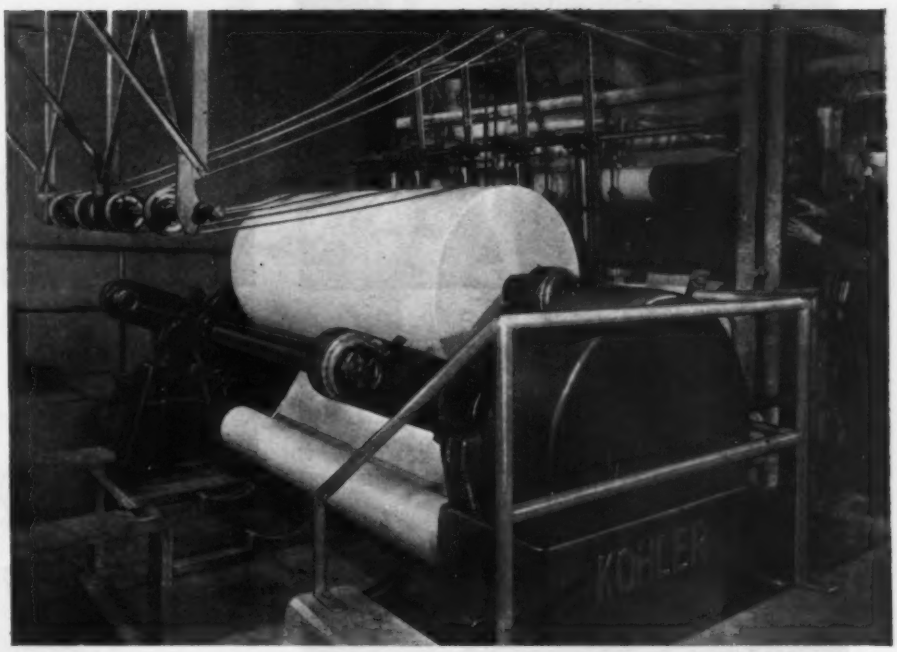
ROLLS ARE CHANGED AT FULL RUNNING SPEED OF THE COATER



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Care should be taken to allow adequate time in warming up the paper machine. The sudden admission of steam under pressure may cause dangerously high stresses resulting in cracking or even an explosion.

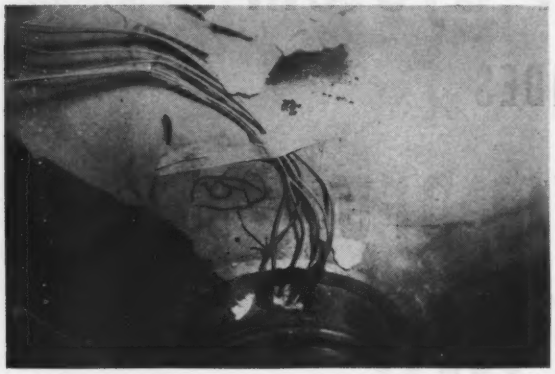

FIG. 13

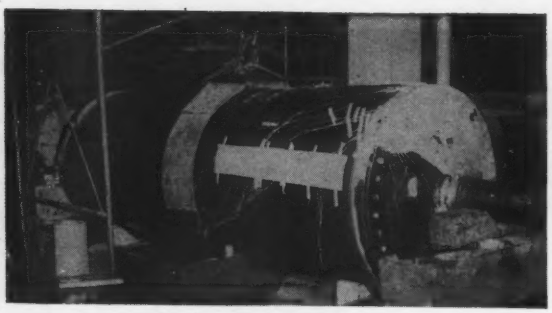

FIG. 14

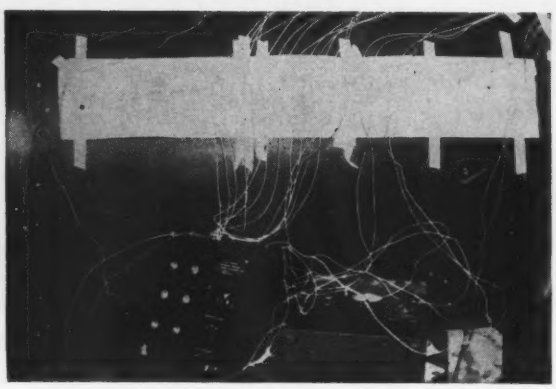

FIG. 15

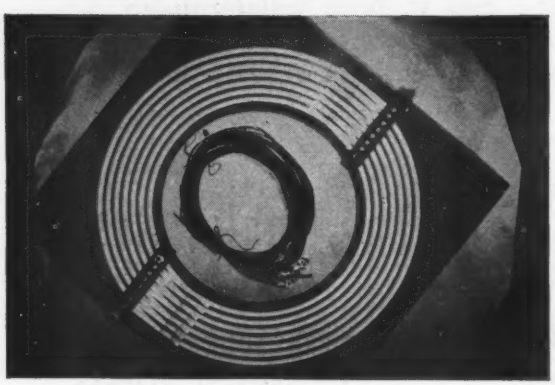

FIG. 16

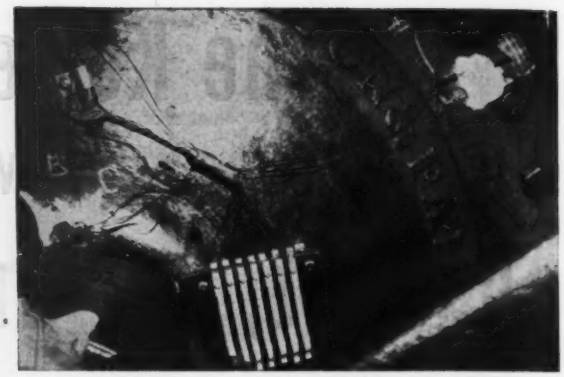

FIG. 17

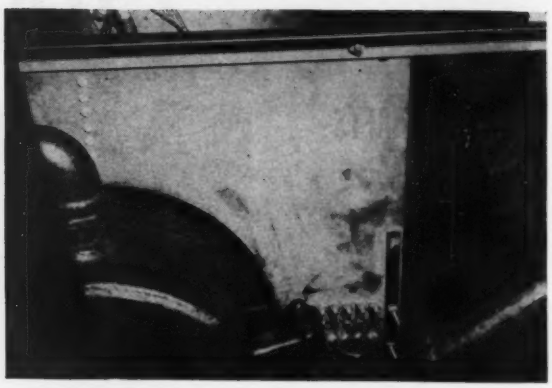

FIG. 18

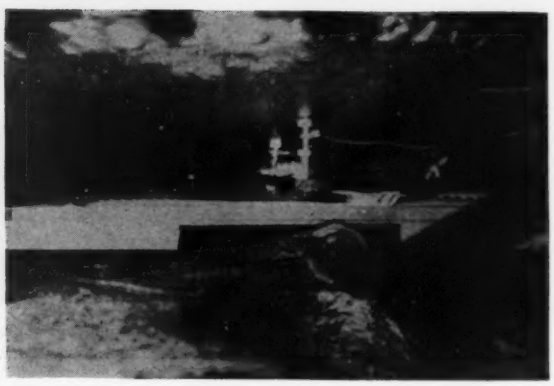

FIG. 19

Lubricating of the bearings at each trunnion is of vital importance if undue wear is to be avoided. Not only will inadequate lubrication cause friction resulting in added torsion, but the resulting wear may also permit the roll to change in position until the gear teeth mesh on the bottom.

Some machines are driven in such a manner that it is possible to develop considerable shock when starting. In fact with a motor drive, the sudden starting shock has been known to shear off the heads of the four bolts holding the bearing cap on the dryer trunnion. Care should be taken in starting the machine so as to avoid this impact.

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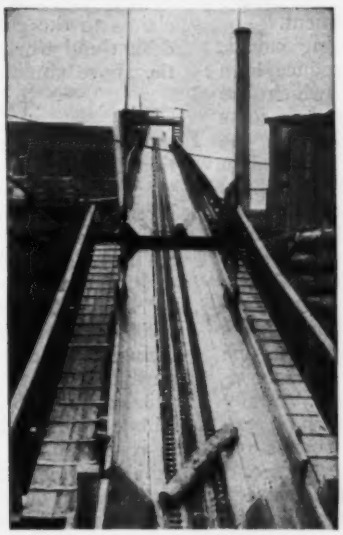
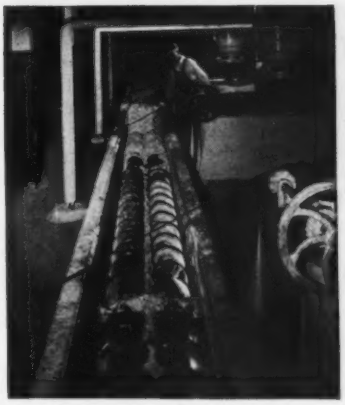
Link-Belt rubber-covered belt conveyor handling wet pulp from thickener to bleach chests.

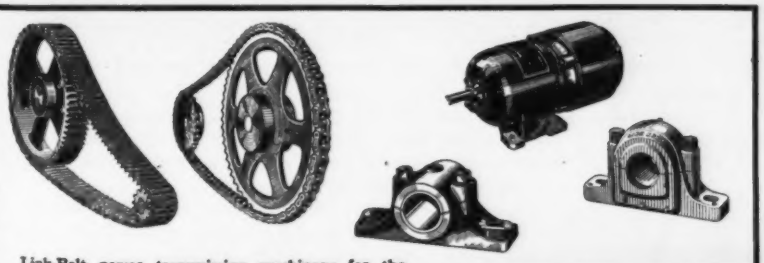


Pulpwood conveyor employing three strands of Link-Belt No. 4124 Promal pintle chain with "RR" type pusher attachments.

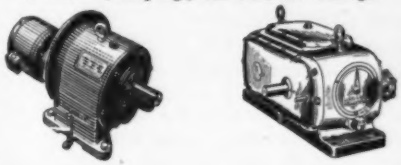


Link-Belt screw conveyor installation employing twin screws handling 16% consistency pulp from filter to bleach chest.

10,645



Link-Belt power transmission machinery for the paper and pulp mill includes silent and roller chain drives, speed reducers, speed variators, the Electrofluid drive, ball, roller and babbitted bearings, clutches, couplings, etc. Send for catalogs.



LINK-BELT CONVEYORS

PREPARATION EQUIPMENT . . . POWER TRANSMISSION MACHINERY

Progress Report on Stock Preparation

By Lionel M. Sutherland

Discussion of the subject of stock preparation has always been difficult even in normal times due to the many variations in furnishes, differences in equipment from mill to mill and varying ideas as to the best method of obtaining the desired result.

Today the subject is even more complex due to the insatiable demand for fiber in any form. Mills have learned, though oft-times at a sacrifice in quality, how to use fibrous materials which they would have refused to consider using a few years ago. Self-contained kraft mills are cooking small percentages of hardwoods with their pine or spruce and in some cases making all hardwood cooks for certain purposes. Other mills are cooking mixed hardwoods or, occasionally, segregating one or more species from the bulk of the wood and pulping separately the wood which requires a modified cooking treatment.

Quick cooks, continuous or batch, using caustic soda or neutral sulphite are used to produce high yield pulps with woody characteristics which are used in corrugating boards, roofing felts and, to some extent, in insulating boards. Modifications in the sulphite and sulphate process have been reported in trade publications and a résumé of these methods has been reported to you earlier in this meeting.

Mills which rely substantially on purchased pulps or waste papers have even more complications in combining the various fibrous materials they are able to purchase in today's markets. Pulps in many cases are bought from several sources with occasional lots picked up in the open market and the pulp from one source varies from the other pulps in its characteristics although each may be labeled "Sulphite." Many mills have an adequate laboratory staff which can determine beforehand the most satisfactory use for each pulp; some mills depend on the experience and judgment of their papermakers to utilize the available pulp in the best manner; while other mills less fortunate in the supply at hand, must use the pulp available or shut down.

The waste paper consumer finds a similar situation confronting him with the added problems arising from the short supply, lower quality of waste paper, plus the frequent necessity of increasing the amount of waste paper in his various furnishes to conserve longer fibered pulps wherever possible. On many occasions the waste paper user has been priced out of his usual waste paper market by the abnormal demand for the better grades and thereby forced to utilize poorer grades of waste than he would normally use.

Stock Preparation Equipment

Despite the ramifications of the industry and the tremendous number of grades manufactured, the papermaker depends principally upon two types of equipment for stock preparation. First to appear in extensive mill use was the Hollander beater and, at one time, it was truly said "paper is made in the beater." During the years many modifications were made in the original design, new ideas were developed and tried along the same lines, but today despite continued improvements, the beater is falling behind more rapidly as continuous systems are gaining in favor. This trend has been accentuated by the terrific increase in labor costs which has focused the attention of management on ways and means of increasing production through installing continuous rather than batch processes.

The other principal tool for stock preparation is, of course, the jordan engine and its several modifications. Obviously, in both the beater and jordan the tackle is varied according to the nature of the work required. For instance, a narrow bar jordan is referred to as a "cutting" jordan and a wide bar one as a "hydrating" jordan.

However, the tackle is arranged, the basic principles of the jordan have changed but little since the earliest days and the power input remains high despite claims to the contrary. Improvements in materials, design and workmanship have not materially altered the above situation.

The Sutherland Refiner

In the past ten to fifteen years, the stock preparation field has been gradually changing and a third type of stock preparation machine has come into increasingly general use on a wide variety of grades. Reference, of course, is made to the Sutherland Single Rotating Disk Refiner. Today almost 2,000,000 tons of board and paper a year are produced in the U. S. with Sutherland Refiners. Of this total about 1,200,000 tons is in kraft liner board with the balance including toweling, corrugating, kraft bag and wrapping, tissue, book, bond, butchers and a number of allied grades. Some refiners are being used in pulp mills on high yield sulphate and sulphite pulps; also, in base refining pulps from soda type cooks. The subject of high yield sulphite and sulphate pulps has already been discussed at this meeting by Mr. Douglas G. Sutherland and, considering the increasing cost of wood, much more will be heard about this subject in the coming years.

Attrition mills are not a new idea in the paper industry as patent office records reveal numerous attempts to successfully adapt the principle of the disc refiner to stock preparation. Double and single rotation attrition mills have been used for many years in dry grinding processes where the end product desired is usually granular. However, despite numerous attempts, success with this type of equipment was not attained until after Mr. D. Manson Sutherland had devoted several years of work to the study and development of this type of refiner.

This work commenced in Canada in 1929 at which time some preliminary plant trials were made on groundwood screenings with a double rotation type unit. Results of the work, as may be expected, were not entirely satisfactory but did provide information and data which was most helpful during the period of active development which followed.

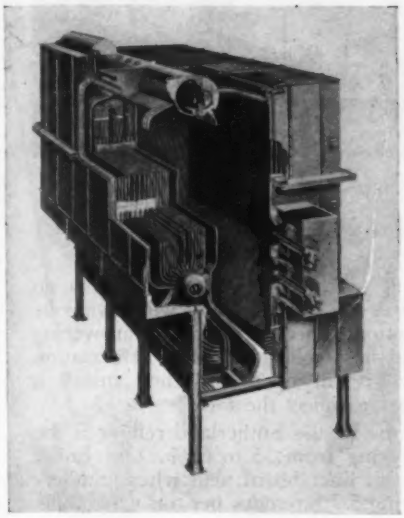
Having confirmed the feasibility of the ideas, two other points were soon determined:

1. Double-rotation discs were power consuming and did not produce results to justify the added power required; therefore, future efforts were concentrated on single rotation.

2. Most refining equipment then available to the

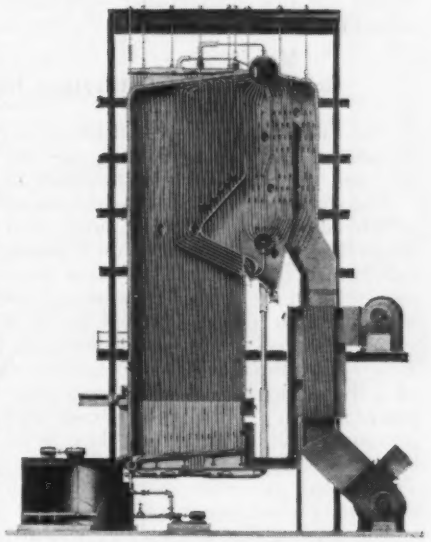
From an address before the American Pulp and Paper Mill Superintendents Association at Chicago.

Modernize with B & W EQUIPMENT



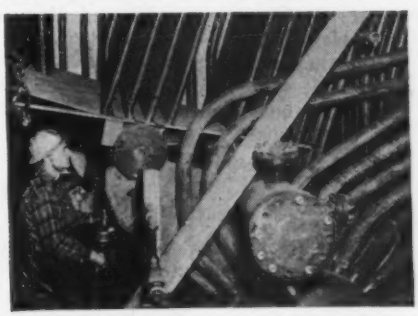
BOILERS. The complete line of B&W boilers and related equipment meets all paper mill requirements for dependable, low-cost steam generation in any combination of capacity, pressure, temperature, fuel, and space conditions. New units ordered in 1946 have total steam capacity of 3,000,000 lb. per hr.

B&W's broad familiarity with the paper industry for over 60 years pays dividends to mill operators in terms of continuity of service, operating efficiency, and greatest return on investment wherever B&W equipment is used. Consult our nearest office for prompt cooperation in modernizing existing plants or planning future developments.



RECOVERY UNITS. High chemical recovery, dependable steam generation and ability to handle wide variations in black liquor concentrations are obtained at low cost in sulphate paper mills with B&W-Tomlinson Recovery Units.

PRESSURE VESSELS. Digesters and other process equipment made of B&W Croloy-Bonded Plate give high-corrosion resistance at lower cost than solid alloy vessels. Sizes and shapes of dependable welded construction can be fabricated by B&W to specifications for any paper mill requirement. All vessels are X-ray inspected and stress-relieved.



TUBES. Seamless and Welded Pressure Tubes are made by B&W in a full range of analyses from simple carbons to high alloy steels including B&W stainless Croloys and B&W Nicloys for any application in paper mill equipment.

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WORKS: ALLIANCE AND BARBERTON, O.; AUGUSTA, GA.

papermaker was not sufficiently rugged for the hard service imposed in the paper mill, so the decision was made that the best engineering and best materials available would be combined in the Sutherland refiner.

That this determination was carried out is shown by the record—during the war none of the approximately 70 refiners then in service were shutdown for necessary repairs and the annual cost of repairs—except for disc maintenance — is under 1% of the initial investment cost.

Construction of Sutherland Refiner

The Sutherland refiner consists of a frame or bed supporting two sub-assemblies, one for the rotating disc and the other for the stationary disc.

The stationary end consists of a stainless steel disc, which bolts to a stationary head, also of stainless steel. The head is mounted on a stainless steel feed tube which is supported on plain bearings. Lateral movement of the stationary head is obtained by means of a hydraulic piston mounted on the feed tube. A pump and small motor supply the oil at pressures up to 400 p.s.i., the movement being controlled by means of a hydraulic valve. Once the desired motor input power and pulp inlet pressure have been obtained the stationary end is locked in place by means of the locking wheel and the hydraulic system is shutdown. This system gives the operator finger tip control of the refiner which is a much appreciated feature.

The rotating disc assembly consists of a disc bolted to a head which, in turn, is keyed to a nickel steel shaft. The radial load is carried by inboard and outboard double row roller bearings, while the thrust load is taken by a Kingsbury oil film thrust bearing. A lubricating system consisting of oil storage tank, gear pump, motor, cooler and filter is provided. A flexible coupling is supplied to direct-connect the motor and refiner.

Stainless steel has been used wherever the pulp contacts the metal. Close grained cast iron is used for the frame.

Performance

The next question and, perhaps the most important one from the papermaker's viewpoint, is: "What will this machine do in my mill?" As has already been mentioned, this is a difficult question to answer simply because of the widely varying conditions which exist

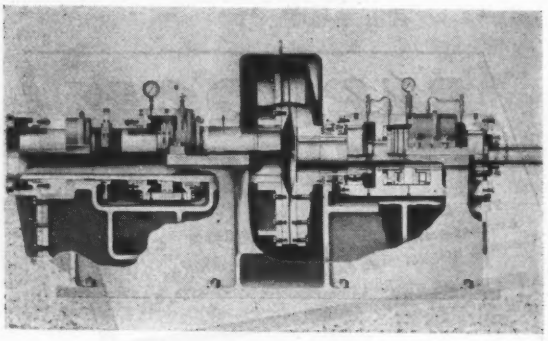

FIG. 1

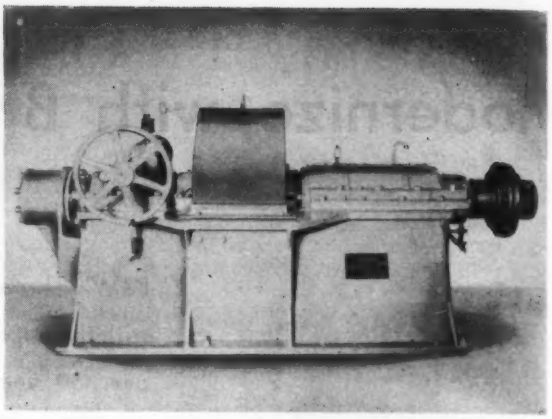

FIG. 2

from mill to mill making the same grades so no matter what figures are quoted, there will always be an apparent exception. The best method of answering the question is to first collect complete information relative to your present operation, then install a Sutherland and again collect the facts!

A striking feature of the Sutherland refiner is the power saving, ranging from 35 to 65%. One broad example is the kraft liner board field where Sutherlands are consuming 5-7 h.p. days per ton while mills using other types of refining equipment are consuming from 9 to 14 h.p. days/tons.

On a base refining job in a pulp mill, the following figures were officially reported by the operators in comparing the Sutherland refiner with two other types of refining equipment on a short fibered pulp.

	S. R.			
	No. 1	No. 2	No. 3	No. 4
Capacity lbs./hr.	8000	6800	4500	3000
KW Input	100	140	145	160
HP/Days/Ton	1.4	2.3	3.6	5.9
Freeness Inc.	575	575	575	575
Freeness Dischg.	500	450	460	460

In this connection it should be noted that the Sutherland refined pulp achieved its optimum refining effect at 500 cc whereas the other equipment developed the same results at 450 cc freeness. Rapid strength development is of great value to the papermaker since it means freer, faster draining stock and high papermachine speeds.

This example also illustrates the large capacity of the Sutherland refiner. Here again, comparative data is difficult to interpret except when the work is performed in the same mill under controlled conditions.

In a book mill a single Sutherland is preparing all the stock for each one of two papermachines producing a total of 95 - 100 tons of book paper per day or an average of 47 - 50 tons of finished paper per refiner. In this case, the furnish is about 90% short fibered pulp. In another book mill, also producing bond, a 32" Sutherland refiner has replaced three pieces of stock preparation equipment producing 15 to 20 tons per day of book and bond with better formation, finish and better test — especially fold. In addition, the operators have the refiner delivering stock to the tray box so they can rapidly adjust the

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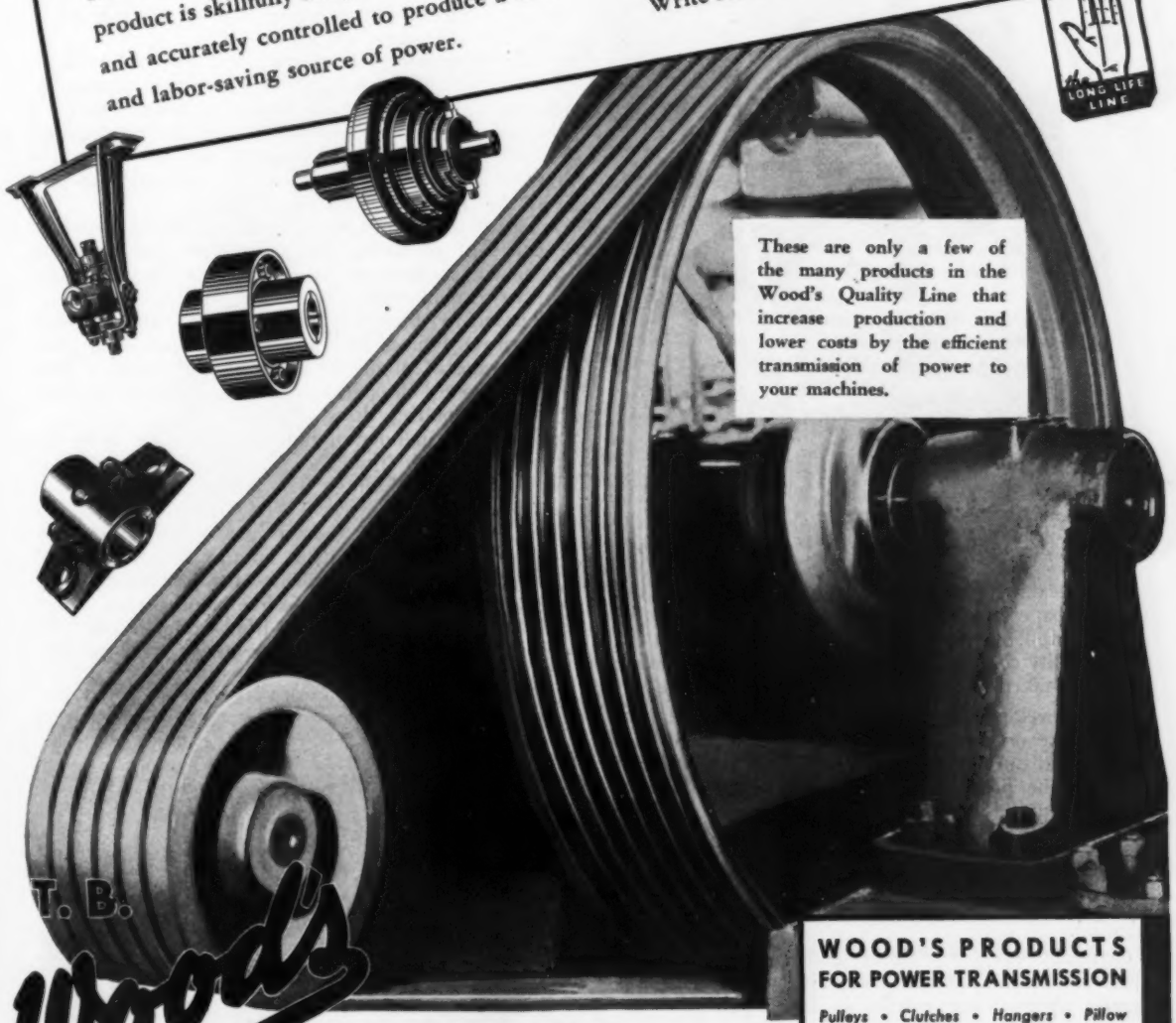

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stock to suit conditions whereas they formerly had an hour's wait before a change was reflected on the wire.

Such things as power savings, floor space, capacity, investment cost per ton, low maintenance costs, are important but so far little has been said about quality. Perhaps quality can easiest be defined as making a grade of paper suitable for the intended purpose. What constitutes the important factors in quality; i.e., mullen, tear, fold, bulk, porosity, tensile, etc.—for a given grade is a subject of much discussion and, in the present market, is mostly theoretical be-

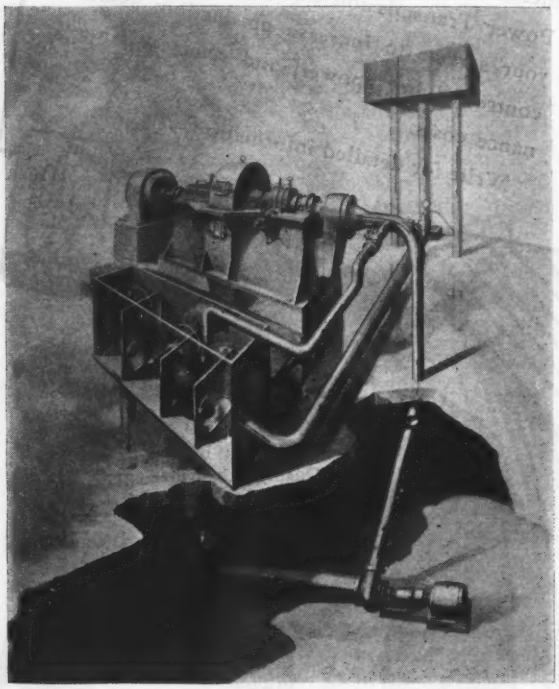


FIG. 3

cause, speaking generally, customers can find a use for any paper they can get. This will not always be the case and, in the long run, mills will have to become quality conscious in those cases where advantage has been taken of the current sellers' market.

New developments and modifications of mill processes have outdated much of the comparative data available in our files which, therefore, isn't of much value at the present time. In other cases the mill management has requested that the information be not disclosed until all test data has been completed and various problems in furnishes, fillers, etc., have been worked out. In some cases special development work is being undertaken which must remain confidential.

Generally speaking Sutherland refiners at least equal test obtained with competing equipment and usually show better results in the significant test items.

A highly desirable characteristic is the early development of mullen with retention of tear. Sutherland refined stock, also, shows excellent folding properties and equal or better tensile test. Runs on kraft toweling have shown exceptional absorptive qualities with high wet pull and tensile as compared to results obtained with other equipment. Many other instances could also be cited.

A matter which is frequently overlooked in making high test papers is the operation of the papermachine. This works to the disadvantage of the stock preparation equipment in that poor test is blamed on the refiners, beaters, etc., when the fault may be due principally to headbox consistency, head of stock versus slice opening or, in other words, whether the stock is rushed or dragged onto the wire, vacuum, roll pressures and draws in the various machine sections. Dryer temperature and paper machine speed are other factors which affect test.

Maintenance

Brief mention has been made of low maintenance costs and a more complete discussion is in order at this time. Ordinarily only packing and gaskets require anything like regular replacement and that varies widely from mill to mill. Radial bearings are selected for heavy duty characteristics and have, with good maintenance, an average life of 100,000 hours or nearly 12 years.

The Kingsbury thrust bearing is operated at about half of its rated load and is guaranteed almost indefinitely, providing the oil film is maintained between the shoes and the thrust collar. An electric pressure switch safety device is installed to shut down the refiner in the event of insufficient lubrication to prevent damage to these costly bearings.

The major item of maintenance is disc repair which consists of removing the worn discs and replacing them with a spare set which takes two hours or less for a two man crew.

The worn discs are then faced off and the disc pattern reproduced with a shaper. Remachining takes an average of about 50 hours in the machine shop although one mill claims as little as 30 hours machine time for repairing discs.

The usual manner of figuring disc wear is by the months elapsed from the startup until the disc is pulled for remachining. This varies widely even in similar types of service due to power load, freeness drop required, daily tonnage and care exercised by refiner operators in setting up the discs. One mill operating refiners at overloads up to 30% obtains an average of a little better than five months wear. Most mills average 6-8 mos. disc life, while in one mill one pair of discs have been operating for 22 months,

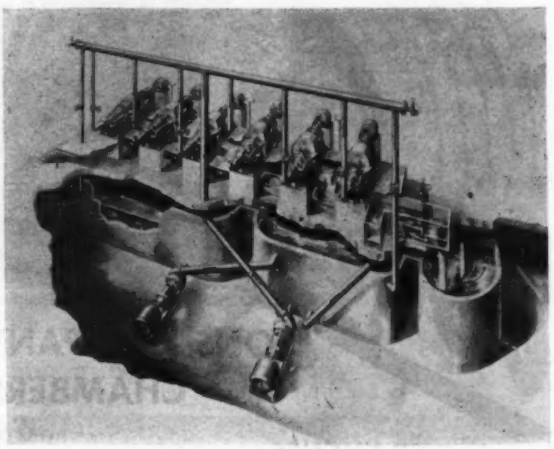
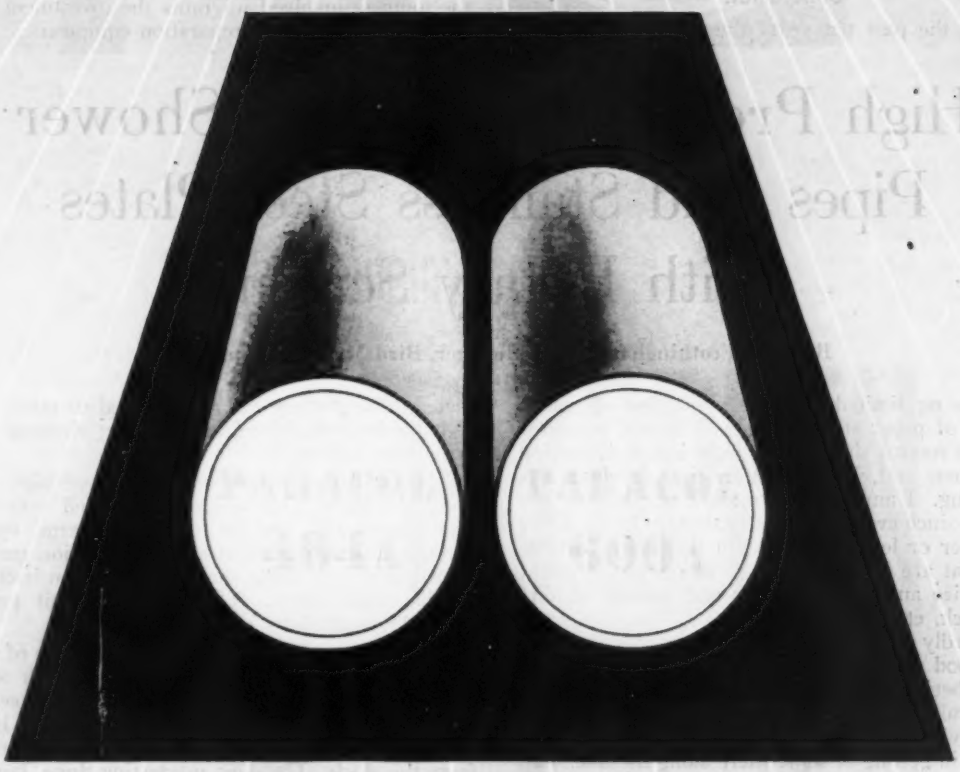


FIG. 4

stable

WAX EMULSIONS



IF EASE of handling and trouble-free performance are what you're seeking in surface applications of wax emulsions, the answer is Paracol* series 400 or 600. Used in the size press or calender stack water box, they remain as stable dispersions, even at a pH as low as 3.5.

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two other pairs 15 months, and another set over 12 months without being removed from the refiner for regrooving.

Apparently the relatively high cost of the special alloy stainless steel discs is well known, but what is not so well understood is the fact that these discs may be recut a number of times before the disc is discarded. Based on considerable operating experience under varied conditions, it is apparent that disc life, conservatively estimated, is about 10 years, since average wear before regrooving runs from .030 to .050 inch per disc and the discs when cast are over 2" thick.

Conclusion

During the past ten years the Sutherland refiner has become a recognized piece of stock preparation equipment. Among its outstanding characteristics are: rugged construction, large capacity, low power per ton of stock, low maintenance cost, and rapid development of test, especially mullen with retention of tear.

While early applications were principally in the Southern kraft field on liner board, bag and wrapping, Sutherlands have been refining a variety of pulps for book, bond, wrapping, tissue and other widely divergent grades.

In the future it is believed Sutherland refiners will be used in making nearly all grades of paper where the tonnage involved warrants the investment in up-to-date modern stuff preparation equipment.

High Pressure Oscillating Shower Pipes And Stainless Steel Plates With Rotary Screens

By F. F. Frothingham, Sales Manager, Bird Machine Company

Time being limited and the principles of rotary screening of paper stock being well known to everyone in this room I shall plunge right into a discussion of these new and, I think, interesting developments in screening. I am anxious to allow ample time for questions, since every mill's screening problems differ to a greater or lesser extent with the many variable factors that are involved such as character of stock, machine size and speed, variety and volume of dirt in the stock, etc.

It is hardly necessary to remind you that the purpose of good screening goes beyond merely providing a barrier between the paper machine wire and material that might damage it as well as the finer but equally devilish dirt that may be in the stock or have succeeded in getting in somewhere along the line. The screen slots do more than that. They act as combs to separate and individualize the fibres just before they flow onto the machine wire, making possible, good uniform formation at maximum machine speed. They keep these fibres free of lumps, strings and slime, thereby assuring continuous operation without breaks. Indeed, without the combination of ample screening capacity and fine cut plates that is so generally employed today, it is not too much to say that the extraordinary production pace the industry has attained and maintained despite raw material and other handicaps would not have been possible.

This brings us to the proper application of screen showers to keep these fine screen slots at all times functioning with maximum effectiveness. To do the job with ordinary shower pipes, even the self-cleaning kind, takes a very large amount of water and all of this water has to be handled and recirculated if waste of fibre and water is to be avoided.

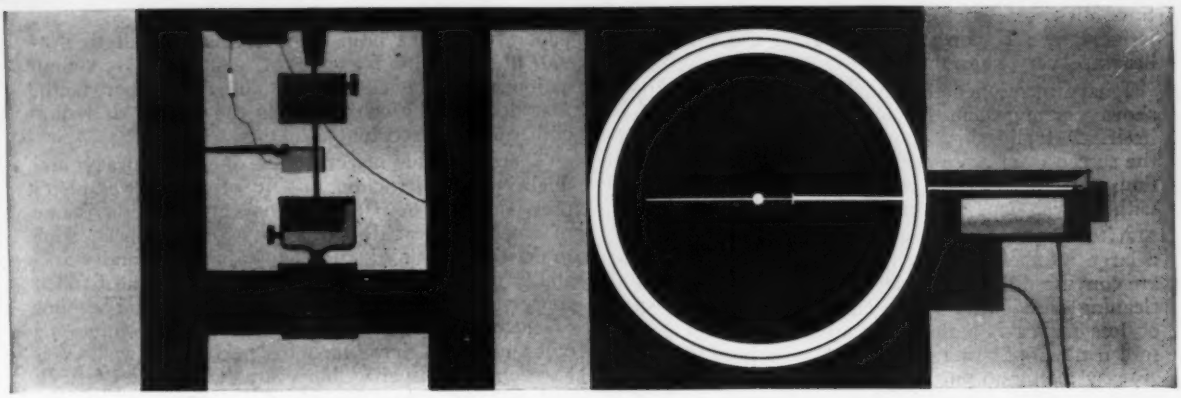
The oscillating shower pipe consists simply of a 1-inch brass pipe into which are screwed stainless steel nozzles with .025-inch diameter holes, spaced 1½-inch apart so that 64 nozzles are employed per 100 inches of screen. Normally, the nozzles are located at right angles to the surface of the screen plate, although they can be adjusted to other angles if individual conditions indicate that cleaning action is thereby improved.

The oscillating action of the shower pipe covers about 3 inches. This action is provided very neatly and ingeniously by an oscillating arm operated through a scotch yoke in a gear reduction unit connected to the eccentric shaft of the screen itself by a flexible shaft drive. The reduction unit provides about 15 oscillations per minute.

As you can well imagine, this combination of nozzle placement and oscillating action plus high shower pressure scours every last screen slot and keeps the plate clean and open at all times. The jet is concentrated on the screen slots after the plate emerges from the stock. The most interesting thing, however, is the way this oscillating shower does a better job with far less water than the ordinary fixed position shower even though the latter employs much lower pressure. As a matter of fact, we recommend 75 - 100 pounds per square inch pressure with the oscillating shower because such a pressure, easily obtained from a small pump if not already available, does an exceedingly efficient job on the plates with far less water than would be used with fixed showers employing one-third the pressure or less.

Here are some figures for a 100-inch screen: The 64 nozzle oscillating shower at 100 pounds pressure takes nine gallons per minute where a fixed shower with 32 holes at 40 pounds pressure consumes 74 gallons per minute; at 30 pounds, 65 gallons per minute; at 20 pounds, 55 gallons per minute. With the oscillating shower even if you cut the water pressure in half, down to 50 pounds per square inch, you only reduce water input about 2 gallons per minute.

I hardly need to tell you what this reduction in volume of shower water means to the system. It has a far reaching effect right through to the paper machine and the Save-all. There is greater flexibility in the use of make-up water and the load on the



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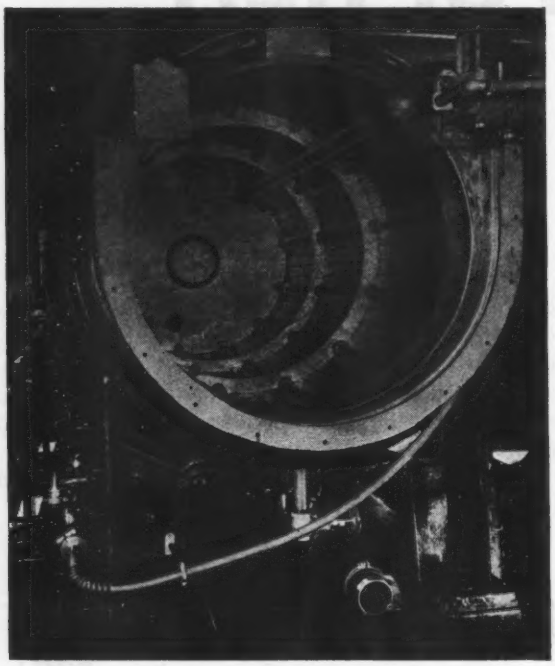
Save-all system is reduced so that recovery efficiency is increased. If you use warm water the savings in heat are very substantial.

I have mentioned the simplicity of the oscillating shower arrangement driving right from the screen itself. Actually this shower makes the interior of the screen even more open and accessible for inspection and cleaning than stationary showers equipped with shower pans and extra piping.

After observing the oscillating shower in action on a large number of screens, old as well as new, we are convinced that its advantages in the way of better cleaning with one-fifth the amount of shower water or less makes it a desirable improvement on every screen now operating as well as to be installed. It's an easy matter to put oscillating showers on existing screens. All we need is the serial number of the screen.

In passing I might say that oscillating showers are a mighty good thing on cylinder molds, too. For this purpose they may be driven by electric motor with reduction gear head, by flexible shaft from the cylinder journal or by mitered gears. When used on cylinder molds the shower nozzles are spaced 3 inches apart and the water per nozzle at 100 pounds pressure amounts to only 0.142 gallon per minute. The savings per shower opening are as great in this case as with screen showers. Foaming is no longer a problem and again the load on the Save-all system is reduced with consequent increase in recovery efficiency. Water temperature is much more easily and economically maintained.

Before my time is up I do want to say a few words about stainless steel screen plates because of the very great interest that has been shown in their application and its possibilities. I think I can speak with assurance when I say that the modern rotary paper screen has been engineered and built to provide the capacity for efficient, continuous screening action with fine cut plates. The only other factor that needs to be considered is the quality and durability of the screen plates themselves.



The Bird Oscillating Shower Pipe, showing its location in the Bird Screen and the flexible drive operating from the eccentric shaft of the Screen itself. Note the open accessibility of the Screen interior made possible by this Shower Pipe

There can be no criticism of the acuracy and quality of construction of any of the screen plates that you have been using. The only question is one of wear. A great deal of good work has been done to develop metals of satisfactory hardness and workability for this exacting service. Plates of hard rolled copper or phosphor bronze have given a good account of themselves and plates coated with chromium or other materials have likewise performed well. You have only to visualize, however, the volume of stock and water pouring through these thousands of fine slots minute after minute and day after day to appreciate the problem of wear. And once the slots are worn so that their edges are no longer uniformly smooth or to the point where their original dimensions no longer exist, screening efficiency is bound to suffer and plate replacement is the only remedy.

Stainless steel naturally suggests itself as a material for screen plates because of its remarkable resistance to wear and erosion as well as corrosion. Machinability, crystallization and cost were problems that had to be solved before satisfactory screen plates of stainless steel could be made. This experimental work was developed at the Magnus Metal Corp. and the result is the well-known Hardy Type Stainless Steel Plate. A combination of stainless steel plate construction, asembly and cylinder construction has been worked out that has been operating over long periods without any sign of wear or of reduced screening efficiency.

There are now over 100 sets of these plates operating in rotary screens in this country and many are repeat orders. The plates are made of four channels with reinforcing ribs or flanges welded together to make a plate 12" x 33½" curved to the periphery of the cylinder. Thirty-nine plates are used in the big rotary screens, twenty-seven in the medium sized screens. These stainless steel plates are only 1/16" thick as compared with the usual 3/16" thickness, and there is no relief milling at the back, the 1/16" being the full thickness of the slot. This makes for free and clean screening and are more easily cleaned by the shower.

The channeled plates are of ample strength. The screen cylinder used with these plates is specially constructed to assure extreme rigidity and thus protect the plates against breakage.

The important thing is that these specially designed and constructed plates and cylinders become a permanent element of the screen. Check-ups after several years of operation show no signs of wear and no change in the smoothness, squareness or size of the slots. This means uniform screening efficiency without plugging or stringing. Based on fairly extensive experience and observation I can say also that we attach no strings to our recommendation of these stainless steel screen plates.

Now, gentlemen, I have said my say about high pressure oscillating showers and stainless steel plates. I invite your questions about these or any other factors affecting screens and screening even though I don't claim to know all the answers. At any rate I thank you for your very courteous attention.

And that's just what Mr. and Mrs. America are doing, for never has there been such a demand for magazines, newspapers, books, catalogs, and advertising matter. Paper manufacturers are continuing their splendid wartime efforts by running at full capacity to meet the record-breaking peacetime demand for paper and paper products.

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Silicones—A New Family of Chemical Polymers

By W. T. Eleveth, Resin and Insulation Materials Division, Chemical Department
General Electric Company

About the turn of the century, in 1904, Prof. Kipping in England laid the foundation with the chemical building blocks we know now as the silicones. His interests over the succeeding thirty years contributed greatly to our fundamental knowledge of the chemical structure of organic-silicon compounds.

With the development of a practical method of producing a woven cloth from glass fibres, a new structural material possessing high temperature resistance and chemical inertness became available to the electrical industry. Fibreglas, as it is commercially known, however, requires a protective coating around the fibres of its construction in order to prevent fraying, cracking and destruction when twisted or subjected to mechanical abuse.

The organic varnishes commonly used to coat Fibreglas permit safe operation of electrical equipment at 260 F and provide a suitable so-called Class "B" insulation as we know it today. Because of their superior resistance to heat, which is of the order of 480 F to 570 F, silicones have intriguing possibilities for treating Fibreglas to provide a protective coating and also to bind individual sheets to make heat-resisting panel board. Thus the fruits of Dr. Kipping's pure research had evidence of supplying a superior insulation far less subject to deterioration with heat.

We may ask why this remarkable increase in heat stability? The silicones chemically bridge the gap between organic compounds based on carbon-to-carbon bonds and inorganic compounds such as sand, quartz and the silicates. The silicones chemically are composed of atoms of silicon surrounded by atoms of oxygen and carbon. The silicon-oxygen linkages furnish the great heat resistance and the similarity of sand. The carbon-silicon bonds with the organic groups, that is, the methyl, phenyl, or other organic radicals attached to the carbon, provide the flexibility and versatility of properties lacking in sand.

The new silicones produced in the pre-war years were somewhat brittle and did not possess the desirable characteristics which are now possible. By the time this country was involved in World War II, research and devolopment had advanced to such an extent that war applications brought on a more than normal demand for their use. Materials such as water-repellents, oils, greases, synthetic rubbers, plastics and compounds were conceived and used to excellent purpose.

In addition to extreme temperature stability, silicones possess several other outstanding properties. Extremely thin films, when applied to paper, cloth, ceramics and glass, render the surface water-repellent to a degree not possessed by waxes or similar substances. This property was made useful in treating aircraft radio ceramic insulators to assure satisfactory performance under severe moisture conditions. The paper filters in Army and Navy gas masks were likewise treated to keep out water in case of accidental immersion during amphibious operations. The process involved was unique to the paper industry. Rolls of paper were passed through a chamber containing vapors of the chemical compound, followed by exposure to ammonia vapor. The contact time was approximately two seconds.

Peacetime uses will include water-repellent fabrics for rainwear, sizing of paper, protection of glassware, plastics and leather goods. Of primary interest to the paper industry will be sizing chemicals, for addition to beater stocks, which are effective in concentrations about 1/10 of that required with rosin. These coatings are heat-stable and not affected by contact with solvent.

Silicone Oils

Silicone oils are heat-stable liquids and possess high flash points, above 600 F, as well as low points of —120 F to —130 F. They will burn only with extreme difficulty when a continuous source of heat is applied. They show much less change in viscosity or consistency than any other known liquids over a range of 500 F to —100 F. They are unaffected by metals and do not sludge at temperatures up to 300 F in the presence of air. Their lubricating properties are not comparable with petroleum, but with proper design of equipment they have given excellent performance in aircraft hydraulic systems. We may expect to be able to use smaller hydraulic lines and save as much as 35% in weight because of their unique viscosity characteristics. We can expect in the future to see other extensive uses in aircraft such as damping fluids and as dielectric liquids for capacitors and transformers. Silicone fluids are already finding many applications as mold release agents in the plastics and tire industries.

Compounds and greases have been formulated from these oils which are used in plug cocks and spark plugs, and we have promise of ball-bearing lubricants for rotary equipment at high temperature and speeds.

Silicone Rubber

Another class of silicones are rubber-like in nature and have found use over an operating range of —50 F to 520 F as resilient gaskets. The tensile strength and tear resistance are somewhat lower than that of synthetic rubbers. This limits their use where such properties are essential. I would like to point out that for continued exposure above 250 F, the tensile strength of synthetic rubber will decrease rapidly to a point below that of silicone rubber. Silicone rubber may be reinforced with Fibreglas or asbestos cloth; this construction will contribute greatly to improving the mechanical properties.

Wartime introduction of silicone rubber was made

From an address before the American Pulp and Paper Mill Superintendents Association at Chicago.

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by the General Electric Co. in its fabricated turbo-superchargers and Navy 12- and 24-inch signaling searchlights. With experience thus gained and subsequent developments, applications will include a widespread use for shaft seals, oven gaskets, refrigerator gaskets, and vacuum gaskets. The designer may at last have a resilient material for use at temperatures at least 100 F above that of synthetic rubbers now available.

As a prediction of things to come with silicone resins, I would like to close by mention of new paint finishes which will far exceed the durability of conventional materials both in chemical and moisture resistance. Outdoor weathering, resistance to discoloration and chalking, and heat resistance far greater than anything outside of porcelain enamel may be safely anticipated. This means to the consumer better refrigerator finishes and longer lasting automobile finishes that will hold their gloss, and new-type oven-range enamels which will not readily chip or crack. High-temperature plastics and adhesives will likewise make their contributions to the world of tomorrow.

High Destiny Pumping and Pulping

By T. Argonin

A knowledge of pulp and paper stock characteristics is required in order to pump or pulp it at high consistencies. Shartle's experience in the development of this knowledge dates back to about 1914 or 1915 when Mr. Hayton and Mr. Bond, who operated the Hayton Pump & Blower Company (later purchased by the Black - Clawson Company) started checking friction losses in pipe lines in order to determine whether or not the data developed to that time, was correct.

They went around to various paper mills and actually checked the loss between two points in various pipe lines by the installation of pressure gauges and measuring pressure drop.

From this data, plus data developed in recent years, we developed a set of friction loss curves. These curves were developed for paper stock up to and including stock of 10 percent consistency. While some of the figures on this curve have been interpolated, the basis for these curves is actual mill data. At the same time the correlating factor between stocks at various consistencies was determined.

About five years ago we developed the Shartle friction slide rule which included the data from these curves. From the size of the pipe line, type of stock and gallonage, we can develop the actual friction loss through any line and thus determine the actual total head loss. By testing various types of stock, we found that very free stocks such as asplund or flax had inherent pumping characteristics similar to high consistency stocks and that the general method of handling them was the same. We were thus able to develop pumps for the cigarette, wall board and roofing mills.

The knowledge which we have developed in handling paper stock is illustrated in our type HMS pump. Each particular feature of this pump which is listed below has a specific application in order to allow the handling of the stock. We have found that stock at high consistencies has a tendency to de-water and will stick to the impeller causing vibration. We, therefore, build this pump as shown with a bearing on each end of the shaft. We do not use an overhung type impeller for handling any heavy stock. This is the only way that the vibration condition can be eliminated.

Paper stock at high consistencies will only flow by gravity to a pump impeller. A large suction tends to introduce less friction loss and, therefore, stock will flow more rapidly to the impeller. We have a number of sizes of pump suctions for each size pump, depending upon the operating conditions, however, for high consistency stock, we use the largest suction possible. We have developed what we call a super-suction casing which is a large rectangular opening which will grout directly into the chest wall.

For standard round suction, we use inlets as large as 16 or 18 inches in diameter for say six inch pumps. The super suction casing is much larger in area and can be used on any size pump which we build. The super suction casing has a built-in slide valve and is grouted directly into the chest wall.

Getting back to the type HMS pump, a vertical suction is used in some installations. A vertical suction allows the release of air from the suction back into the chest in order to insure that the stock will flow to the pump.

Paper stocks at high consistency have to be agitated in order to produce an even consistency. This is especially true of kraft stocks which are free, in addition to being of high consistency. We, therefore, install what is known as a breaker impeller in the suction of the pump. This breaker impeller is a two arm impeller which tends to agitate and even out the stock consistency. This is a very important factor in handling high consistency stock.

A factor which must be considered in high consistency pumping is air in the stock. High consistency stock usually has considerable entrained air in it. Therefore, when it is agitated by the breaker impeller, the air had a tendency to be released, forming large air bubbles causing airbinding. It is thus necessary to sometimes install a vertical vent in a horizontal suction of a high consistency pump in order to allow the air to be released, or, use a vertical suction.

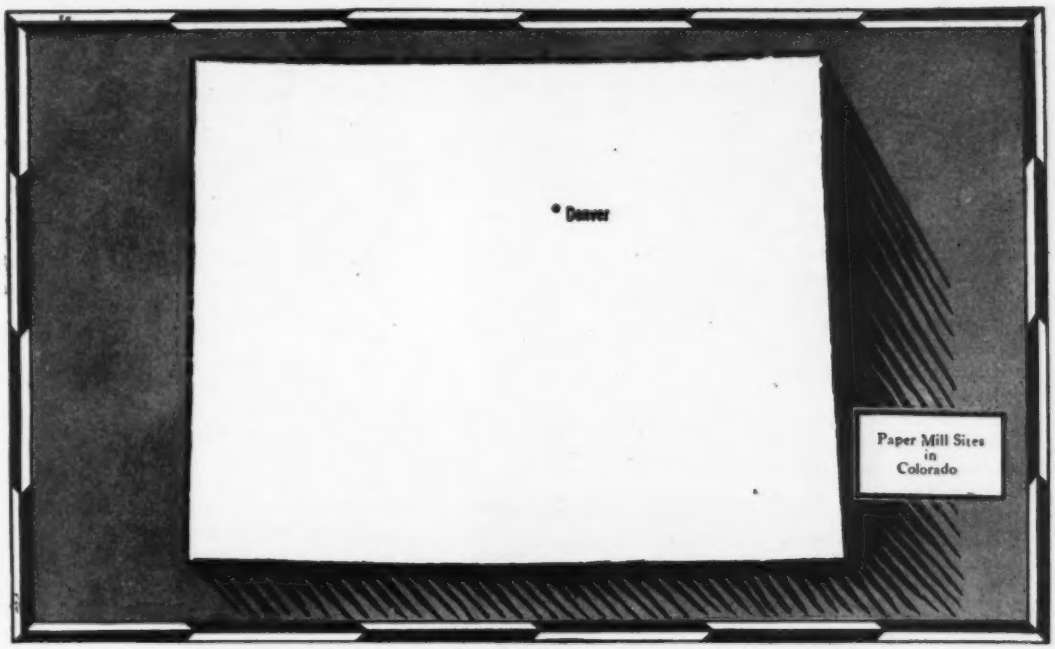
Once we even out the consistency, it is necessary to make sure that the stock will reach the impeller eye. The restriction through any centrifugal pump is through the impeller eye itself. We make sure that the stock reaches the impeller by the installation of a feeder (or booster) impeller, as it is known, between the breaker and centrifugal impeller. This booster impeller feeds the stock to the eye, or opening, into the centrifugal impeller.

We have developed special impellers for handling paper stock. We have approximately 250 impeller patterns designed for this application alone. We use the type of impeller which will best suit any specific application. For instance, in some cases we use the Francis type impeller which is featured by a large eye, or inlet, opening and it is used for large capacities and relatively low heads.

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 31 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS



Map copyright by L. D. Post, Inc., New York, N. Y. American Map Co., New York, N. Y.

HIGHLIGHTS: Colorado enjoys the distinction of being one of two States which has only one paper mill within its boundaries. The other State is Rhode Island, and if a 49th State is admitted to the Union, as has been predicted, it will be the Territory of Hawaii, which likewise has a single paper mill.

Colorado's one mill is in the city of Denver, and quite naturally having waste paper available as the only native raw material, concentrates its manufacture on chip board, combination board and jute test liner. The capacity of its 96 inch, five-cylinder machine is estimated in the trade directories as "100,000 pounds in 24 hours."

Draper Felts for Efficiency

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Canton, Massachusetts

RALPH E. BRIGGS Sales Manager

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We use our special design straight vane impeller for higher heads and relatively smaller capacities.

The first thing which must be known, however, in the current design of an impeller, is the actual head required to get this high consistency stock to its ultimate destination. This dates back to the knowledge as listed in the first part of this paper. In other words, we can calculate the total head required for handling any type of paper stock of any consistency up to and including 10 percent.

Knowing this head, we can then select or design a specific impeller to handle the stock.

Thus, we have a centrifugal pump design which is especially developed for handling high consistency stock.

The HMS pumps are designed for impellers at a maximum head of about 175 feet.

This is a point which we wish to stress because it is a point which is overlooked very easily in normal discussions of high consistency stock pumps. It is not the consistency which determines whether any specific pump will handle the job, but rather the total head in combination with the consistency.

We have run across certain applications where it is impossible to handle even 5 to 6 percent stock with any single centrifugal pump. We have also come in contact with other applications where any kind of stock can be handled at 9 to 10 percent without any difficulty. For instance, on a recent hydrapulper installation, we had no difficulty dumping 9.7 percent kraft stock. If the line had been shorter, or we had more head development in this particular pump, there is no reason why we could not have handled 10 to 11 percent with the same pump.

The main difficulty handling stock over 10 percent is that we have not as yet had an opportunity to develop our experience in friction losses through lines handling stock over 10 percent.

We always stress the necessity of getting a sketch of the discharge piping before we release any pump design to our shop for fabrication. The reason for this is that our stock friction curves do not check out with the other curves as developed by other manufacturers.

High consistency stock is a viscous material and the friction loss when passing through an elbow is relatively small compared to the friction through the line. When handling water, the reverse is true because the loss through an elbow is exceptionally high due to the eddies set up by the water in going around the curve.

We have found that some of the companies figure relatively high losses through elbows when handling stock. Thus, if we take somebody's else figure for a total head, we sometimes find that when the line is long with few elbows, their figure is much lower than ours, and, vice-versa, when the line is short with a number of elbows we find that their figure is much higher than ours.

From experience in a number of pump companies, I have used various other friction curves, however, I have found that the curves which we use are more accurate in the sense that we have less difficulty figuring friction loss through various pipe lines when handling practically any type of stock.

There is one other factor which we have found quite important in handling paper stock and that is relatively low peripheral impeller speeds.

You have heard about impellers which can actually cut a hole in water. Excessively high peripheral speeds will cause the same effect with a viscous material such as high consistency paper stock. It is, therefore, necessary to keep the speeds of the impellers down as low as possible for good operating conditions.

Of course this, in a sense, depends upon the application but it is a good practice to keep in mind when you want satisfactory operation of your high consistency pumps.

Thus, you see we have developed a pump which has all the characteristics required for effective handling of high consistency stock in one rather simple machine.

One pump and one motor gives you all the parts required for this application.

It is not necessary to put in any special boxes, extra motors, or any impellers driven by another drive as Shartle obtains the same operation from a single pump driven by a single motor.

High consistency pulping is, in a sense, tied in with high consistency pumping because the same characteristics of stock come into effect. We have found, for instance, that the pulping in a hydrapulper at high consistencies, requires relatively low speeds of impellers. We have found that it is necessary to use relatively large diameter rotor ratios between the rotor and the hydrapulper tub.

When these conditions are developed, we have no great difficulty in pulping high consistency stock.

As I previously mentioned, we have applications, where under tests 9.7 percent kraft was pulped and we have a number of applications whereby we pulp 10 to 11 percent de-ink stock. Of course, de-ink stock is slippery and there is no comparison between that and kraft or virgin sulphite.

I wish to again stress that the mere mention of consistency does not, in any case, give you the story but rather the accompanying factors such as type of stock, condition of stock, and other things which must be considered before anybody can brag about what their particular machine is doing at any specific consistency.

We do not advertise that we will handle stock at any consistency, but we do advertise that we will pump or pulp stock at the highest consistency possible.

As an example of this, we have pulped in our laboratory paper stock at 16½ percent consistency. You will note the photograph showing the operator actually pushing the stock back into the tub. We are not as yet in a position to offer this machine commercially to the average mill because we have not developed pumping equipment, or refining equipment, to handle it at this consistency, so there is really no great advantage to it. However, we have done a lot of experimental work in our laboratory at Fulton and we feel that this high consistency pulping, when tied in with correct handling of the stocks at this consistency, can revolutionize the present treatment of stock.

We all know there is no great advantage in treating stocks at low consistencies except for the necessity of getting it in such a condition that the refining machine will handle it.

For instance, actual tests have demonstrated that refiners at 6 percent do a better job than refiners at 4 percent, providing the refiner can handle it at the higher consistency. That is what we are now attempting to do. Our laboratory, together with our engineers, are all working on the development of the equipment which will make this feature of pulping at high consistency of value to the paper mills.

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DISTRIBUTORS OF WOOD PULP
BLEACHED AND UNBLEACHED
CHEMICAL AND MECHANICAL WOOD PULP

Paul's infancy was so active, and so disturbing to the neighbors, that his father made a seaworthy log cradle and anchored it off the coast of Maine. Every time Paul tossed in his sleep he caused a tidal wave that swept away entire villages.

A reproduction of this incident from the fabulous life of Paul Bunyan—the eighteenth of a series—will be sent on request. It will contain no advertising.

Air Scrubbers for Tissue Mills

By W. K. Metcalfe, Secretary
J. O. Ross Engineering Corporation

For sometime there has been the need for an air scrubber that has no nozzles to clog, that can easily be made to vary the size of droplet in the spray, that does not require a large amount of makeup water, and that operates with minimum power expended. The answer to this need is apparently the Ross Scrubber.

The unit is similar to an air washer, except it has no nozzles. A series of revolving wheels equipped with modified saw tooth projections around the periphery dip into the water and create a spray. The operation of the wobble wheel passing through the water results in a self cleaning, non-clogging action. Any degree of dust, dirt, fibre or foreign material does not affect the operation outside of possible abrasive action on the wheels. A comparatively large settling chamber in the bottom of the scrubber allows objects heavier than water to remain at the bottom away from the action of the wheels.

The size of the droplet in the spray is obtained by merely varying the water level. When the wheels just kiss the surface of the water a very fine spray with small droplets is the result. However, if the wheels dip into the water an inch or more, the spray is coarse and the droplets large. Any desired type of spray between these extremes can be easily obtained at the operator's will. The adjustment is simple and the new setting can be quickly made. There is no equipment removed and different parts installed, every time a change in spray quality is desired. The water level is maintained by either a ball float or an adjustable overflow box, depending on the service the unit is required to accomplish.

A scrubber of this type, when operating as a cleaning unit, requires a minimum of makeup water, since the operation is not influenced by the degree of material or particles in the water that a pump or certain size nozzles will handle. A minimum dilution with fresh water is needed, since only the amount that is carried away in the air passing through the scrubber is lost.

The horsepower required to rotate the shaft to which the wheels are attached is not great as can be seen from operating Chart "A".

There is no application that would call for a conventional spray washer that a Ross Scrubber would not do equally well. There are many units used for humidification, dehumidification, cooling, cleaning of air, fume elimination, or reduction of fume concentration, and related applications.

There are, however, three specific uses in tissue mills for which this type of equipment is ideally suited, namely—

1. Cleaning air for use in Calender Cooling, Motor Cooling, and the like;
2. Yankee Machine recirculated air cleaning;
3. White Water Heating.

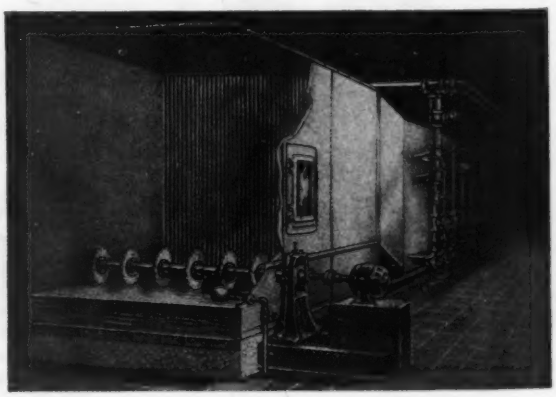
Air in and around a tissue mill is full of paper dust and lint. Any of you who have observed the intake side of heaters drawing air from the machine, room recall how the fins of the heater sections were usually white with dust. Obviously, this dust should not pass through piping systems or apparatus, nor be blown into calender nips to be ironed into the surface of the sheet (later to be dislodged when the sheet is being used) or blown into the windings of a motor.

The solution is not always as easy as drawing the air from outside. Often the source of outside air at the roof, court or alley way is almost as bad as utilizing air inside the mill building. In these cases a non-clogging unit, which can use the water over and over again with a high concentration of dust in the solution, best serves the purpose.

More and more thought is being given to the reuse of air being exhausted from Yankee machines. A considerable steam saving can be realized by the use of recirculated air. For instance, in round figures, a Yankee machine, exhausting 25,000 CFM. at 140° F., 70% relative humidiity, will be throwing away 215,000 BTU.'s per minute, or the equivalent of 200 pounds of steam per minute, or at 30 cents per 1000 pounds steam cost, $25,000.00 per year. If, say, 25% of this heat can be reclaimed by recirculation, the saving realized would of course be somewhat over $6,000.00 annually. Actually, in many cases more than 25% of the exhaust volume can be recirculated.

To use this air, however, it is necessary to eliminate the dust and lint without loss of temperature. Since the water in a scrubber is used over and over again, the temperature of the water is soon in equilibrium with the wet bulb temperature of the exhaust air, and the recirculated air loses no heat while being cleaned. This is why a scrubber incorporating the design features outlined above is best suited for such applications.

Tissue mills will be interested in knowing that there is now equipment available with which to heat white water. Previous to the development of the Ross Scrubber, there was no practical method of handling this need. If nozzles were tried, it was found that a nozzle giving a fine spray soon plugged and maintenance and nuisance value outweighed the results obtained. On the other hand, if a nozzle was



Phantom View of the Ross Scrubber

From an address before the American Pulp and Paper Mill Superintendents Association, Chicago.

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MAKES STRONG PULPS

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GREATER WET STRENGTH

ADDS STRENGTH TO SHORT FIBRES

Definite Results from a unique, Strong Flexible Film

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used with large enough orifice to eliminate clogging, the drops of water were so large that they did not heat as they passed through the exhaust vapors.

The recommended scrubber for this type installation is similar to that shown in the phantom view, except the bottom tank is divided into two parts. The white water is introduced on the side having the wobble wheels, and the other side acts as a collection hopper for the heated water. Since large quantities of water are handled, the ball float valve is replaced by a flooding head over the first set of two banks of eliminators. Excess white water is supplied to the unit and the proper level is obtained by an adjustable weir box arrangement.

Sizes are identical to those shown in Chart "A" except the length is 18" longer in each to allow for the double set of eliminators. Between the two sets of eliminators there is a space for inspection and cleaning with access doors on each side.

Continuing with the same example of 25,000 CFM, exhaust, but reducing the temperature in order to make the results more typical (of machines other than Yankees) to 125°F., 60% relative humidity, the volume of water handled would be 90 GPM., and if this amount is heated from 60°F. to 95°F. the resultant saving would be $3,500.00 on a 30 cent per 1000 pounds of steam cost basis for a 300 day year.

If, in addition to the above, a combination of not only white water, but fresh water and Briner Economizer air heating apparatus is installed, the savings can be more than doubled.

Some mills may find that their white water temperatures are increasing to the point that a white water scrubber heating system is no longer giving them a reasonable return. As stream pollution programs are advanced and better closed systems are maintained in the mills, this condition will become more and more likely to exist. However, this possibility does not have to detract from the installation, because a scrubber can be used for fresh water heating as well as white water heating. In fact, the fresh water that is sprayed just preceding the eliminator at the exhaust fan inlet, can be drained by gravity to the scrubber and heated with the hottest exhaust vapors.

As time goes on, improvements will be made and new applications will be found for this type of equipment. We venture to say, the Ross Scrubber will be a very useful piece of apparatus in Tissue Mills.

CHART A—STANDARD ROSS SCRUBBERS

Size	Capacity	No. Wheels	Motor Size
10C	1,000 CFM	2	½ HP
20C	2,000 CFM	2	½ HP
30C	3,000 CFM	3	¾ HP
40C	4,000 CFM	4	¾ HP
50C	5,000 CFM	4	1 HP
60C	6,000 CFM	5	1½ HP
70C	7,000 CFM	5	1½ HP
80C	8,000 CFM	5	1½ HP
90C	9,000 CFM	6	1½ HP
100C	10,000 CFM	6	1½ HP
125C	12,500 CFM	6	1½ HP
150C	15,000 CFM	9	2 HP
200C	20,000 CFM	10	2 HP
250C	25,000 CFM	12	3 HP
300C	30,000 CFM	12	3 HP
400C	40,000 CFM	15	5 HP
500C	50,000 CFM	19	5 HP
600C	60,000 CFM	21	5 HP
700C	70,000 CFM	23	5 HP
800C	80,000 CFM	26	7½ HP
900C	90,000 CFM	29	7½ HP
1000C	100,000 CFM	32	7½ HP

THE FORK TRUCK MOVES CORRUGATED ROLLS

The 36-inch rolls can be rolled from the freight car to the platform incline leading into the plant, where they are picked up by a battery-powered fork truck.

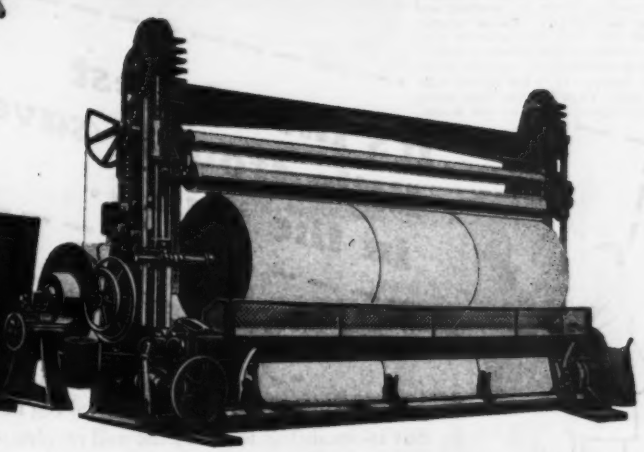
Corrugated paper rolls are carried from freight car to storage and tiered.

When paper rolls are needed they are removed from the bottom by the fork truck, allowing two top rolls to slide gradually into the lower positions.

Faster production of Better Rolls

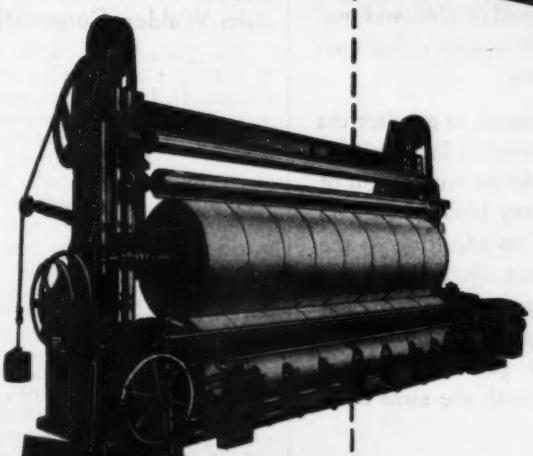
CAMACHINE 20

For newsprint book and kraft. Web widths 180" to 310". Speeds up to 3000 fpm.



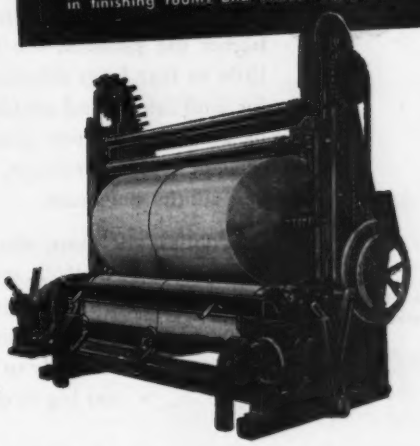
CAMACHINE 19

For newsprint, book and kraft. Web widths 118" to 192". Speeds up to 2800 fpm.



CAMACHINE 14

For paper and paperboard. Web widths 53" to 90". Speeds up to 1400 fpm on paper, 800 fpm on board. Also widely used as rewinder in finishing rooms and converting plants.

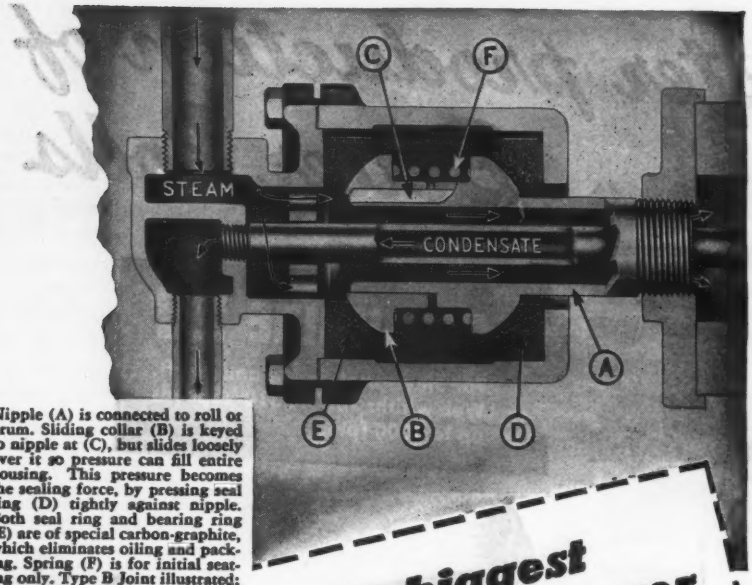


CAMACHINE 18

For paper and paperboard. Web widths 73" to 162" on paper, 73" to 142" on board. Speeds up to 2000 fpm on paper, 1200 fpm on board.

WRITE FOR LITERATURE

CAMERON MACHINE COMPANY · 61 POPLAR STREET BROOKLYN 2, N. Y



Nipple (A) is connected to roll or drum. Sliding collar (B) is keyed to nipple at (C), but slides loosely over it so pressure can fill entire housing. This pressure becomes the sealing force, by pressing seal ring (D) tightly against nipple. Both seal ring and bearing ring (E) are of special carbon-graphite, which eliminates oiling and packing. Spring (F) is for initial seating only. Type B Joint illustrated; other types, sizes for all needs.

...it's the biggest little trouble-saver in the mill...

In terms of physical size alone, the Johnson Joint could hardly be called big machinery. But in its ability to save time and trouble, and promote plant efficiency, its stature approaches anything the industry has ever seen.

The Johnson Joint was designed to go after the old stuffing box and steam fit troubles in a businesslike way, and it literally knocks the stuffing out of them. There's no packing of any kind. There's no oiling required, ever. There's no adjusting — the higher the pressure, the tighter the seal. There's little to fear from misalignment—with provision for both lateral and angular movement built right in. Note besides how neatly it provides for more efficient syphon drainage, through the same head that admits the steam.

In dollars and cents, what does all this add up to? Well . . . enough at least to pay the cost of switching over to Johnson Joints in just a short while. Enough certainly to make the Johnson Joint too big to overlook.

Write for literature and the name of your nearby Johnson representative.

JOHNSON
Rotary Pressure
JOINTS

THE JOHNSON CORPORATION
828 WOOD STREET
THREE RIVERS, MICHIGAN

Egan Interests Organize Bound Brook Engineering Co.

BOUND BROOK, N. J.—The Bound Brook Engineering Company, 108 Hamilton Street, has been formed to serve the paper industry. The company is composed of three partners; Frank W. Egan, Edward F. Egan and Lawrence W. Egan.

Frank W. Egan has been engaged in the paper converting industry since 1921, designing and manufacturing coaters, printers, treaters, laminaters, crepers, embossers, drying systems, and other types of equipment that is used to convert paper.

Edward F. Egan, M. E., a graduate of Stevens Institute of Technology was a drying engineer with the J. O. Ross Engineering Corporation since 1940, except for the war years when he served in the South Pacific as an Engineering Officer in the Air Corps.

Lawrence W. Egan, M. E., also a graduate of Stevens Institute of Technology was a methods engineer with Ransome Machinery Company, a division of Worthington Pump & Engineering Corp. During the war he served as a Flight Engineering Officer on a B-29.

The Bound Brook Engineering Company has made arrangements to represent the Guider Specialty Company in the paper industry. Their "Mecho" Air Guider will permit the winding of an unevenly wound roll, or the proper guiding of a web into a paper converting machine.

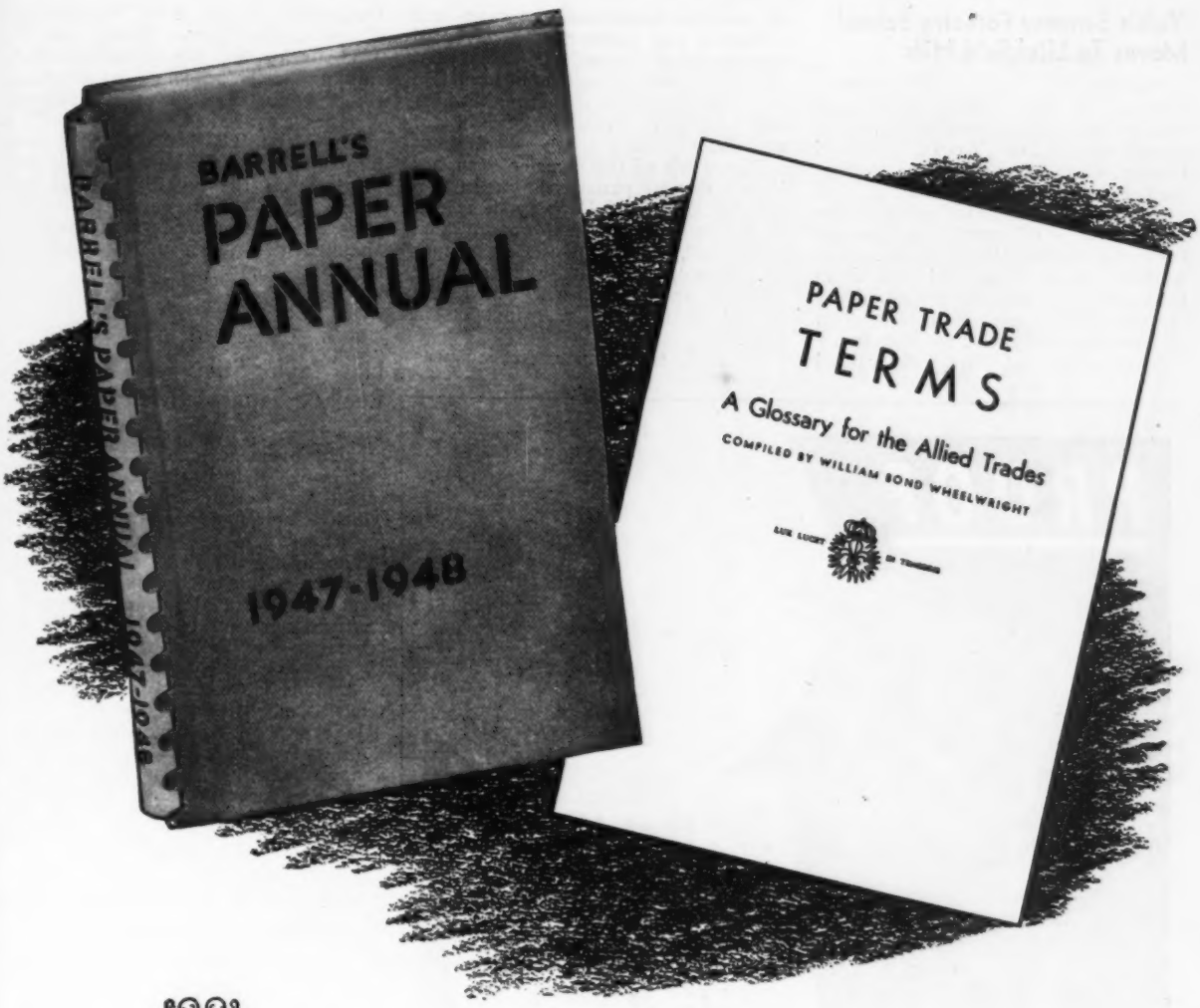
Thomas H. Latimer Joins John Waldon Corporation

NEW BRUNSWICK, N. J.—The John Waldron Corporation has named Thomas H. Latimer as executive engineer in charge of engineering, drafting, and estimating. Prior to assuming his new duties, Mr. Latimer, a Cornell University graduate, was chief engineer of the Black-Clawson Company, Hamilton, Ohio, with whom he has been associated for the past ten years. Previous connections with the paper industry were with the Rice Barton Corporation, Minton Vacuum Dryer Corporation, and the Jessup & Moore Paper Company.

Before leaving to assume his new duties, members of the Black-Clawson engineering department, bringing gifts and best wishes, gave a surprise party at his home in Middletown, Ohio.

Mason-Neilan Sends Brown To San Francisco

BOSTON — Mason - Neilan Regulator Company has appointed John W. Brown, sales engineer, as manager of its San Francisco office. Mr. Brown is a mechanical engineer, formerly with the Instrument Department of Standard Oil Company of Ohio. He came to Mason-Neilan in 1945, spent over a year in the engineering department, then became sales engineer in the Pittsburgh office.



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WILLIAM L. BARRELL CO. Lawrence, Massachusetts

Yale's Summer Forestry School Moves To Litchfield Hills

NEW HAVEN, Conn. — The summer term of the Yale School of Forestry will be held at the school's camp in the Great Mountain Forest, Litchfield County, Conn., from June 25 to September 9.

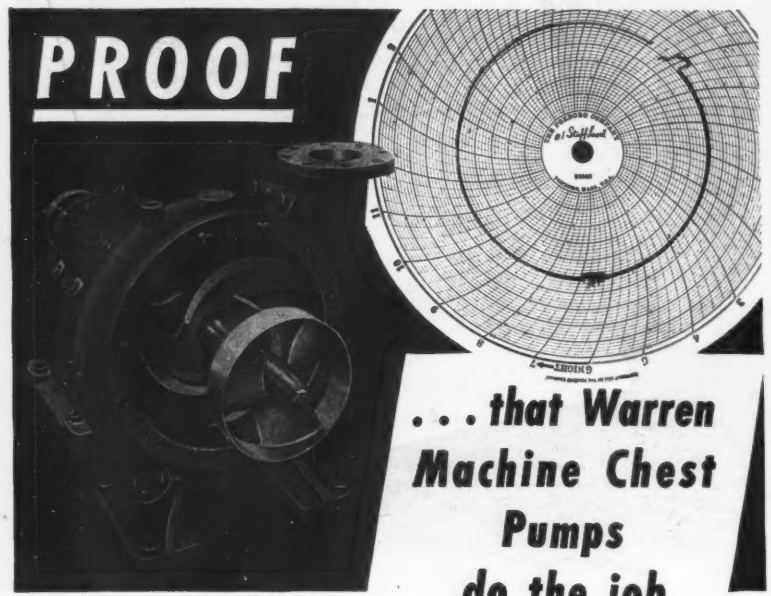
More than 26 men, including graduates of twelve different American colleges and universities as well as five students from India and one from Denmark, have already registered for the eleven-week period of instruction in surveying and forest mensuration.

After a lapse of four years caused by wartime conditions, the camp was reopened last summer with a record enrollment of 34 students. This year, the instruction will again be carried on under the direction of Eugene V. Zumwalt, Assistant Professor of Forestry at Yale.

The work of the summer term has been a regular part of the instruction for the Master of Forestry degree at Yale since 1904, when it was initiated at Milford, Pa., on the estate of James W. Pinchot, whose family provided the original endowment on which the School of Forestry was founded in 1900.

In 1927, the summer session was transferred to the Yale Engineering Camp at East Lyme, Conn., and, in 1933, its location was again changed, this time to the school's 7700-acre forest tract in Tolland and Windham counties, Connecticut.

The extensive destruction of the larger timber on the Yale Forest in the hurricane of 1938 greatly reduced the effectiveness of this area for some phases of the summer-term instruction, and made desirable a further change in location.



THE chart above, made at the plant of a large paper manufacturer, is positive proof of the constant, uniform delivery of Warren Machine and Jordan Chest Centrifugal Pumps. It shows a 24-hour record of stock level in the regulating box... head in chest varied from 0 to 8 feet, yet practically throughout the entire test, the Warren Machine Chest Pump maintained the regulating box level *constant to a fraction of an inch!*

A Warren Centrifugal Chest Pump gives you these advantages over a plunger-type pump: smooth flow without pulsation; discharge valve can be closed and not build up excessive pressure on pump and discharge line; takes up less floor space and much less head room; no pockets to hold old stock; a diagonally split case makes it unnecessary to remove discharge piping—rotating member can be easily lifted out; no noisy gears to create vibration.

The maintenance charges of a Warren Centrifugal Chest Pump are low as compared with a plunger pump. Renewable liners prevent wear on suction heads—there are no plungers to be turned or replaced. *And in addition, the initial cost of a Warren Centrifugal Chest Pump is lower than that of a plunger pump of much smaller capacity.*

A Warren Centrifugal Machine or Jordan Chest type pump . . . in operation in *your* plant . . . will assure uniform delivery under varying conditions of suction, submergence and density of stock. Write for complete information and list of installations.

Warren Pumps

CENTRIFUGAL *AND* RECIPROCATING PP-43½

Warren Steam Pump Company, Inc., Warren, Massachusetts

New Taylor-Stiles Feed Really a Separate Machine

NEWARK, N. J.—Perhaps the greatest improvement made in its larger cutters by Taylor-Stiles and Company in the past year or so is in the feed, which is now mounted on roller bearing casters and is driven by a motor of its own, instead of being driven from the main shaft. This feed motor is mounted on a platform underneath the feed apron and is operated by a reversing switch. It is wired up from above, with sufficient slack to allow the motor to be moved back with the whole feed assembly.

It takes about ten minutes to remove the new feed assembly. Because there is no connection with the main driving shaft it is only necessary to remove the balance wheel guard, four feed assembly holding bolts (two on each side) and roll back the whole feed assembly, motor, chain guards and all.

With this motor-driven feed, with its reversing switch, usually mounted on the feed assembly trough near the feed-in end, the operator can stop the feed, reverse it, and straighten out any trouble in less time than it takes to tell about it. Catching jams at the start this way, one man can do what would take two or three men fifteen or twenty minutes to do with the regular assembly, when a jam had time to build up and there was no feed reversing mechanism to help them.

It's safer, too, for the operator to just stand back away from the vicinity of the knives, and to reverse the feed, than it is to try to straighten out a tangle without stopping the whole cutting operation.

Southern Advances Pays 40 Cents Extra Per Share

BOSTON — The Southern Advance Bag and Paper Company, Inc., has declared its regular 20 cents quarterly dividend on the common stock and in addition a 40 cents extra dividend (total 60 cents) to stock of record June 13, payable June 30, 1947.

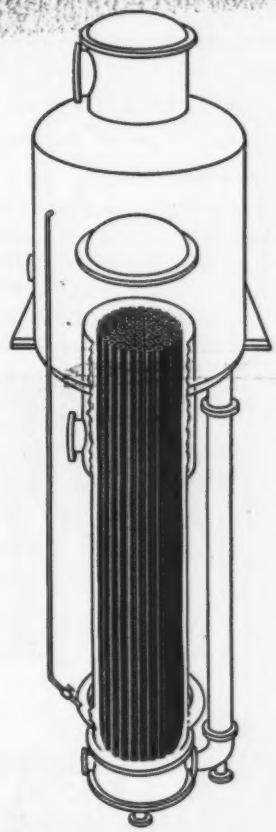
The previous dividend was 40 cents (20 cents regular and 20 cents extra) paid on March 1, 1947. This is the fourth consecutive dividend increase by this company.

NICLOY TUBES

offer HIGH CORROSION RESISTANCE with ECONOMY in severe ALKALINE conditions

Nicloy tubes are meeting the need of paper mill operators for a better, yet economical, tubing for carrying black liquor and other strongly corrosive solutions. Fortified by their nickel content*, Nicloy tubes offer remarkably high resistance to attacks from alkaline media in recovery units, agitators and related production equipment. In these applications, they have proved far superior to many costlier alloy tubes, and show a higher service-to-cost ratio.

Three grades—with 3½, 5 and 9 percent nickel content respectively—enable you to take advantage of Nicloy tubes in a wide variety of corrosive conditions. You'll find Nicloy tubes easy to roll in, expand and flare; of uniformly high quality and made to close dimensional tolerances.



*Chemical Compositions

	Nicloy 3½	Nicloy 5	Nicloy 9
% Carbon	.20 Max.	.14 Max.	.12 Max.
% Manganese	.30 - .60	.30 - .60	.30 - .60
% Phosphorus	.040 Max.	.040 Max.	.030 Max.
% Sulphur	.040 Max.	.040 Max.	.030 Max.
% Silicon	.35 Max.	.35 Max.	.15 - .30
% Nickel	3.25 - 3.75	4.75 - 5.25	8.00 - 10.00

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DIGESTED

So, I say if we crack up now, it will be the result of our own folly, of wilful disregard of warning beacons, of thinking and talking ourselves into ruin. And above all, it will be because of a lack of constructive statesmanship in labor, management and government.

True, we are in the midst of an economic readjustment, but there is nothing for the public to be alarmed about. It's been going on since the war. It's a healthful and vital post-war process if achieved in orderly fashion.

And I have found management across this country not at all panicky, but resolute and determined to work out this business realignment with a minimum repercussion on the economy.

One of the things that will do more to take the bumps out of the adjustment period than anything else is constructive labor legislation.

The general public sees great promise too in the rebirth of the will of the people as the supreme source of laws instead of economic dictation by New Deal, business baiting zealots. EARL BUNTING, President of of the National Association of Manufacturers.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1947		Corresponding Weeks—1946	
April 12	100.7	April 13	103.6
April 19	105.9	April 20	102.5
April 26	105.3	April 27	100.6
May 3	107.5	May 4	107.3
May 10 (Revised)	107.9	May 11	102.8
May 17	*105.3*	May 18	98.3

COMPARATIVE MONTHLY SUMMARIES

1946						1947	
Jan.	94.7	May	100.7	Oct.	106.4		
Feb.	98.4	June	104.6	Nov.	105.5	Jan.	102.1
Mar.	104.4	July	94.0	Dec.	97.0	Feb.	105.9
Apr.	102.7	Aug.	104.7		——	Mar.	106.1
		Sept.	101.3	Avg.	101.1	Apr.	105.1

COMPARATIVE YEARLY SUMMARIES

	1940	1941	1942	1943	1944	1945	1946	1947
Year to Date	86.0	92.1	101.8	89.0	88.3	88.5	101.1	*105.3*
Year Average	85.6	97.4	90.4	87.8	88.1	89.4	101.1	

PAPERBOARD OPERATING RATIOS†

Current Weeks—1947		Corresponding Weeks—1946	
April 12	96	April 13	101
April 19	102	April 20	101
April 26	100	April 27	95
May 3	102	May 4	101
May 10	101	May 11	97
May 17	*102*	May 18	92

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1946	90	91	100	99	94	97	89	99	96	100	99	92	96
1947	99	103	101	*100*									

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

EDITORIAL

Accurate Perspective

It would be impossible to devote attention too widespread to an analysis of the relationship between profits, prices and wages in the paper manufacturing field that was distributed this week by E. W. Tinker on behalf of the American Paper and Pulp Association. He has not only done a great service to the manufacturing industry, his sentences should prove helpful to those who would achieve a perspective on the whole scene, to those who would read understandingly, and even to some who would write or speak accurately. Among the latter are to be listed various financial sources, and an occasional spokesman for the special interests of labor.

This phase is emphasized for the very good reason that too often paper manufacture and paper products are simply lumped together in a single total and the paper industry is made to bear the brunt of figures which it does not produce, even though it contributes to them. The problems and the profits of paper converters are by no means to be disregarded, but they do not belong in a study that, by its implication, appears to talk about the paper industry. That is the cause of considerable confusion, and it is confusion of a type that when it is removed from its context may be actually misinforming or deceptive.

Average net earnings Mr. Tinker shows, after all expenses and taxes for United States paper manufacturing companies over the last thirteen years was 5.72 percent of the net worth. An estimated 68 percent of these earnings was retained in the business either in the form of additional equipment or as added financial reserves against a "rainy day." If workers are to retain their productivity he argues, the machinery must be constantly renewed, and new equipment added. In order to provide capital for this, the investment must be sufficiently attractive to investors so that funds will flow into the industry.

It should be realized also that the great increase in construction costs has made all depreciation reserves entirely inadequate to replace wornout equipment. It is, therefore, necessary for corporations to make higher profits now and to retain more of them in the business in order to have the money available when it is needed to replace wornout equipment. That is as important to the workers as it is to the stockholders.

As for the general theory that wages should be adjusted to profits, Mr. Tinker declares one would be in the position of advocating a wage scale that varies from mill to mill. For that is the way profits are. Fifteen companies report net profits after taxes of 5 percent or less on net worth. There are even some 11 that made less in 1946 than in 1945. There is no uniformity in the earnings rate and mills in the lower scale of earnings would, according to the program advanced, be entitled to pay lower wage rates than those in the higher earnings brackets. Either that or, if relatively uniform wage rates are applied, the wage increase would force them either to raise prices or to lose earnings.

The Superintendents

To the American Pulp and Paper Mill Superintendents Association the industry, as a whole, last week paid its annual respects. An account of the convention which lifted the Association into its yearly extra share of prominence appears elsewhere in these pages. Many of the more significant addresses that were delivered at the series of meetings in Chicago also are printed at length in the pages that precede this one. The adept blending of informational sessions and social relaxing that always attends a gathering of superintendents was abundantly in evidence, and against the highlights of such a concentration of productive ability was the always present consciousness that these are the men who have delivered the industry amazingly high record of production during the past couple of years. Their annual weekend in the sunlight of the industry's spotlight only serves to remind every one who makes his living from the paper business that these men not only have what it takes, they are able to deliver it too.

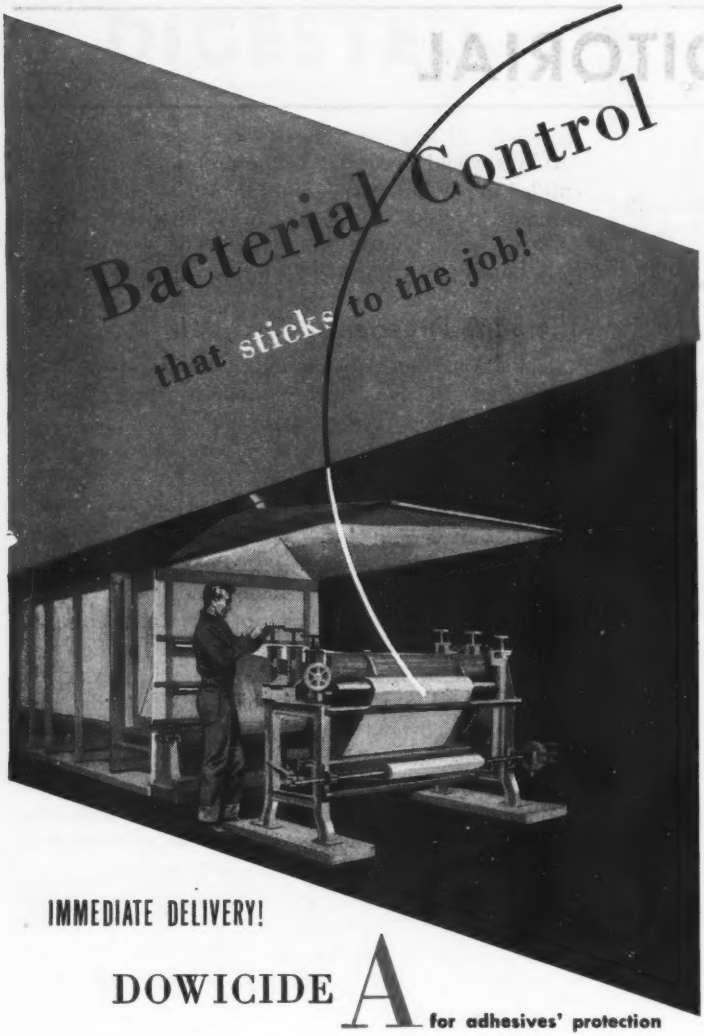
To their own organization, as might be expected, the superintendents have brought the same degree of intelligent application as they have shown in their own individual operations. In his brief welcome and review of the year, retiring President Homer Latimer paid some attention to this trend. The Association has set up a permanent continuing Planning Committee, whose duty it is to help and advise national and sectional officers, leaving these men free for executive duties. Such a step cannot but have a beneficial effect, tending, as it does, for permanence of policies, particularly where projects, as is most often the case, must be developed over the years, rarely being more than attempted in the term of the man under whom they are begun.

Another phase of the collective interest of the superintendent is to be found in the maintenance problem. This phase of the job was given a session of its own during the past year at Middletown, Ohio, and President Latimer was able to report that those who attended had benefited by their presence there.

The South is to come in for a growing share of the superintendents' attention, it would be indicated. Next year's convention is to be held at New Orleans, a movement which is expected to be instructive both for southern mills and for northern men.

W. L. Cook

EDITOR



IMMEDIATE DELIVERY!

DOWICIDE A for adhesives' protection

In adhesives—in *any* industry that suffers from the constant working of microorganisms, you can gain effective control—and save money—by using Dowicides.

Consider how the adhesives industry benefits from Dowicide A. Adhesives use natural gums, dextrin, gelatins, corn and wheat starches, animal glues and casein—an interesting diet for bacteria!

But Dowicide A, added during manufacturing processes—even in minute percentages—halts bacterial damage. It prevents decomposition, preserves viscosity, maintains adhesive qualities and lengthens the life of glue bonds. Its high killing power assures *dependable* adhesives for use with paper, textiles, wood, leather and rubber.

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CHEMICAL COMMENTS

Methocel Licks Important Problems in the Leather Industry

Coating the grain surface of chrome- and vegetable-tanned leathers with Methocel before they are pasted on frames for drying reduces shrinkage. The use of Methocel also gives added smoothness in grain, and results in a gain in surface area. Using either the 1500 or 4000 cps. types, thick pastes can be produced with a minimum amount of Methocel, making possible added economy, and easier removal from the hide since penetration is reduced. Addition of small amounts of glucose further assists in the removal of the Methocel from the dried leather.

Perchloroethylene Vapor-Cleans Metal Parts

Vapor degreasing with Perchloroethylene is an economical method of cleaning metal parts before assembly or in preparation for other operations. The parts to be cleaned are suspended above a bath of Perchloroethylene allowing the vapor to condense on the cold metal to dissolve grease and flush away lint and chips. Perchloroethylene is nonflammable, stable and has high solvency for oils, waxes and a majority of the die lubricants used in casting and stamping. It is also used in liquid phase operations and is especially adapted to cleaning metal preparatory to plating. Degreasing surfaces with this solvent prevents blistering and peeling of platings.

Jacketed Kettles that Cook with Dowtherm

Multipurpose kettles constructed for the laboratory or semiplant use Dowtherm, a heat transfer medium developed by Dow. Such kettles are built with the jacket bottom enlarged to accommodate a small quantity of water, Dowtherm E or Dowtherm A. This pool of liquid can be heated with electric or gas heat to provide vapor for heating the kettle. The unit is operable at temperatures ranging from 200° F. to 700° F., with corresponding pressures not exceeding 125 lb. per sq. in.

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SECTION OF THE

TECHNICAL ASSOCIATION
OF THE PULP AND PAPER INDUSTRY

122 E. 42nd ST., NEW YORK 17, N. Y. Edited By R. G. MACDONALD, Secretary

Studies in Slime Control–1946*

By John W. Appling[1], John F. McCoy[2] and B. F. Shema[3]

Abstract

After a brief historical introduction, the authors described various fundamental studies related to slime control which are in progress at The Institute of Paper Chemistry. A resume of laboratory evaluations of disinfectants recommended for use in the paper industry is given. Details of a laboratory study of the effect of pH upon toxicity values of Lignasan, Merfenel A, Dowicide G, and Roccal as determined by the streak plate method indicate clearly that the choice of an effective mill disinfectant should be based on prevailing pH conditions, among other factors. Lignasan and Merfenel A behaved similarly in the pH range of 4 to 8.5 toward the three test organisms, namely, Aerobacter aerogenes, Bacillus mycoides, *and* Aspergillus niger. *In the pH range tested, Dowicide G was more toxic toward all three organisms at the lowest pH levels for their growth (pH of 5 for* A. aerogenes, *pH of 6 for* B. myocodes, *and pH of 4 for* A. niger*). On the other hand Roccal was more toxic toward all three organisms at 8.5, which was the highest pH level tested.*

During a period of 5 months starting April 1, 1946, numerous attempts were made in each of two paper mills (a kraft mill and a book mill) to correlate bacterial counts of the mill systems involved with slime control for different levels of dosage with Lignasan and Pyridose. Not only did many uncontrollable factors resulting from changes in operating conditions interfere, but no serious slime conditions were encountered in either mill.

Attention was then directed to groundwood pulp mills in which there were real slime problems and for which operating conditions appeared less subject to variation. Meanwhile, two important developments had taken place in laboratory studies related to slime control. One was a method of determining the probable minimum effective dosage of a given disinfectant by determining the survivals of bacteria after 6 hours of exposure to different concentration levels of the disinfectant in a mill sample of slurry, white water or white water sludge. For example, the survival of 1% of the initial number of bacteria, present in the white water sludge from groundwood pulp mill No. 1 treated at various levels of Lignasan, occurred at the level of 4 p. p. m., which was considered the probable minimum effective dosage of Lignasan for this system. Using white water from mill No. 2 and Lignasan, the probable minimum effective dosage of the latter was 25 p.p.m. Other values were 0.8 p.p.m. of Pyridose for mill No. 1 and 200 p.p.m. of Santobrite for mill No. 2. The second important development in laboratory studies was a simple and rapid method for the determination of toxic residuals in the mill system being treated. This method was applicable in the case of each of the three disinfectants mentioned above. It was possible to study the duration of Lignasan, Pyridose, and Santobrite residuals in mill systems when any of these materials was present singly. Studies of the relation of these residuals to bacterial counts and to slime formation were initiated. It was found, for example, that the duration of continuous residual for Lignasan in mill No. 2 was 75 minutes when additions of 10 pounds were made at 2-hour intervals and 135 minutes when they were made at 1-hour intervals. These findings occurred too late in the year to take fullest advantage of them for slime control.

The effect of Pyridose on slime control was studied in groundwood pulp mill No. 1. On the basis of the value of 0.8 p.p.m. for the probable minimum effective dosage in this mill, the actual mill dosage was calculated at 5 ounces per ton (dry fiber basis). The amount needed was added at regular intervals at the grinders. Since slime control for a short period of study was unsatisfactory, a second run was made using the dosage recommended by the manufacturers of Pyridose. The dosage rate was 2.5 ounces per ton, added at the grinders and in the refiner system at 8-hour intervals. Again slime control was not satisfactory as judged by slime formation; however, the bacterial counts were lowered considerably and the slime was generally more easily removed during the clean-up.

The most extensive study was made in groundwood pulp mill No. 2 where Lignasan alone was used at different dosage levels for 8 consecutive weeks and Lignasan alternated with Santobrite was used at one dosage level for 2 weeks. The initial Lignasan dosage of 8 pounds added to the white water system was calculated on the basis that 25 p.p.m. was the probable minimum effective dosage. The various changes in dosage rates (amounts and spacing of additions) were made on the basis of data on Lignasan residuals in the mill system and on the basis of slime formation on a marked section of the rifflers. After 4 weeks of various treatments with Lignasan alone, it appeared probable that this material might not completely elim-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

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[3] Research Assistant, The Institute of Paper Chemistry, Appleton, Wis.

inate slime from this mill. The use of Santobrite alternately with Lignasan on a daily dosage basis for 2 weeks indicated clearly an improvement in slime control in this mill.

Although a number of articles on paper mill slime have been published during the past decade, one is still confronted with a lack of really objective mill data to indicate the degree of slime control achieved. Although it is beyond the scope of the present article to discuss all of the recent literature on slime, the authors will refer briefly to several articles to emphasize not only what information is available, but also what is badly needed.

The nature and identification of paper mill slime has been discussed by Douglas *(1)*, Nason, Shumard, and Fleming *(2)*, Holmes *(3)*, Martin and Dobson *(4)*, and Sanborn *(5)*. For obvious reasons manufacturers of slime control agents have been actively interested in advancing the knowledge and control of slime. Investigators in this field generally agree that slime is caused by one or more of the following groups of microorganisms: nonsporeforming bacteria, sporeforming bacteria, and filamentous fungi (including yeast and yeastlike forms). The investigators cited above generally agree that nonsporeforming bacteria belonging to the genus *Aerobacter* are more frequently present in slime than any other group of microorganisms.

Mill data on slime control have been submitted by various investigators and the following citations practically constitute a complete literature survey on this phase of the subject. In 1936, Douglas *(1)* considered slime to be a paper mill disease which was caused by various groups of microorganisms. He diagnosed mill slime on this basis, after which he treated the disease by bacteriological control—first in the laboratory and then in the mill system. King *(6)* of the same organization rated 47 chemicals "according to their efficiency on slime organisms in paper machine white water." The test procedure used was developed in the company laboratory. Seven of the most promising of the 47 chemicals were tested on a mill scale. The most effective and satisfactory of all was ethylmercuric chloride (or phosphate.) These tests were made in western newsprint mills. Grant *(7)* tried consecutively in a Canadian newsprint mill each of five different slime control agents and found that the most effective was Nalco 23 used in conjunction with chloramine. Incidently, he confirmed the experience of many other investigators in finding that slime control involved considerably more than deciding upon a particular chemical agent and its dosage rate. The last mill study to be reviewed here was not really concerned with slime control, but the approach used and the data obtained should be applicable to slime control studies in mill systems. Suydam and McConky *(8)* described their experiences in chlorinating both fresh and white waters and in achieving general cleanliness in the mill. Break-point chlorination was applied to the fresh water and simple chlorination to the white water. These studies resulted in the production of paperboard with a consistently low bacterial content.

In an attempt to determine the status of slime control in the paper industry during 1943, the senior author *(9)* sent a questionnaire to each of 43 representative mills in the United States. A critical analysis of the 34 replies indicated not only that slime was out of control in 25% of the mills reporting, but that the degree of slime control in the other mills varied from fair to satisfactory. The ever changing pattern of slime control agents and their dosage rates reflect generally unsatisfactory slime control in the paper industry. Consequently, the Biological Control Committee of the American Paper and Pulp Association authorized The Institute of Paper Chemistry to conduct a limited number of mill studies in an attempt to correlate bacteriological evaluations of slime control agents with the control of slime in mill systems.

Since a steadily increasing number of chemical agents have been offered to mills, some with and others without guaranteed slime control, the necessity of evaluating these materials became imperative. The Institute initiated work on slime control agents along this line in 1942. Having evaluated a considerable number of these materials, it became necessary to recommend materials for specific slime problems. This led to a tentative laboratory method for determining the dosage rate to be used in a particular mill system. The authors believe that their experiences with this method may assist other investigators; hence, they are reporting their progress in determining dosage rates in the laboratory. Logically, these rates had to be confirmed by mill performance. Studies in two pulp and in two paper mills will be described to show what was accomplished in 1946. Brief mention will be made of a newly developed bio-assay which the authors developed and employed to determine the residuals of slime control agents in mill systems. This technic already shows promise of settling such moot questions as deal with the frequency and dosage rates for most effective slime control.

Evaluation of Slime Control Agents in the Laboratory

During the past 4 years several technics have been used at The Institute of Paper Chemistry to evaluate chemical disinfectants recommended by their respective manufacturers for use in the paper industry. Among the technics the first ones used were: (a) the flask method, in which a water suspension or solution of the disinfectant is employed; and (b) the Petri plate method, in which the disinfectant is mixed with nutrient agar in sterile Petri dishes. Appling and Shema *(10)* reported in 1942 various data for killing concentrations as determined by the flask method and for inhibiting concentrations as determined by the Petri plate method. After considerable experience with these two methods, Appling and McCoy *(11)* decided to use the Petri plate method extensively and to employ three different test organisms. This decision was based upon the ability to obtain more consistent and reproducible results with this method than was possible with the flask method. Two bacteriological laboratories co-operated in reaching this decision: that of the Institute and that of a manufacturer of chemical disinfectants. In addition to the advantages of consistency and reproducibility, the authors have found the Petri plate method to be less time consuming and to require less equipment than the flask method.

Using the Petri plate method, Appling and McCoy *(11-13)* reported laboratory data in the inhibiting concentrations for eighteen commercial disinfectants recommended for use in the paper industry. These values were determined for each of three test organisms—namely, *Aerobacter aerogenes, Bacillus mycoides,* and *Aspergillus niger*. The first was selected as a representative species of nonsporeforming bacteria which are frequently found in paper mill slime; the second is a representative species of aerobic sporeforming bacteria which are found in most papers; and the

last is a representative species of the fungi commonly designated as molds and found on lap pulps and papers. A careful examination of the eighteen disinfectants indicated four general groups on the basis of the chemical constitution of the active ingredients: (a) organic mercurials; (b) chlorinated phenolics; (c) detergents; and (d) composition either unknown or confidentially disclosed to the authors. There are three in the last group about which the authors have no information concerning the chemical constitution of the above ingredients. These are Caso-Cide (Permacide AM-10), Penetox, and Ramplex C-106. The Biological Control committee has since authorized the Institute to work only with disinfectants whose chemical composition has been disclosed at the time the materials are submitted. Although the data for the eighteen disinfectants have been published, these data have been conveniently summarized in Table 1. No attempt has been made to bring the cost data up-to-date and, for this reason, the authors recommend that the manufacturers of the disinfectants be consulted directly with regard to current prices.

In testing the eighteen disinfectants whose inhibiting concentrations are given in Table I, the nutrient agar medium used had a pH value of approximately 7 prior to the addition of any disinfectant. In the case of the mold *Aspergillus niger*, the pH of the malt agar medium prior to the addition of any disinfectant was approximately 5.5. No attempt was made at that time to determine the effect of pH upon the toxicity of the disinfectant toward the test organisms. Furthermore, the pH values was assumed to be unchanged by the addition of disinfectants to the agar medium. Although this assumption was probably justifiable for the lower concentrations of the disinfectants, it was seriously questioned for concentrations as high as 1000 p.p.m.

After consultation with several authorities who had had years of the experience in the paper industry, the authors decided to study the effect of pH upon toxicity for the range of 4 to 8.5. The pH levels selected were 4, 5, 6, 7, and 8.5.

The decision to determine the inhibiting concentration of a disinfectant at each of five levels of pH for each of three test organisms made it necessary to select a small number of disinfectants. It was thought that chemically related substances would probably behave similarly over a given range of pH. Two organic mercurials, one chlorinated phenolic compound, and one detergent were finally selected for the study of the effect of pH upon toxicity as determined by the plate method. The disinfectants were: Merfenel A (containing phenylmercuric acetate), Lignasan (containing ethylmercuric phosphate), Dowicide G (containing sodium pentachlorophenate,) and Roccal (containing a mixture of high molecular weight alkyl-dimethyl-benzyl-ammonium chlorides.) Two organic mercurials were included to determine whether or not marked similarity in toxicity might be expected for substances which are closely related chemically.

TABLE I.—TOXICITY DATA FOR VARIOUS DISINFECTANTS (PLATE METHOD)

Name of Disinfectant	Average Inhibiting Concentration, p.p.m. *Aerobacter aerogenes*	*Bacillus mycoides*	*Aspergillus niger*
I. Organic mercurials			
Lignasan	10	1.6	6
Phenylmercuric acetate	1	0.1	1
Pryidylmercuric acetate	1	0.15	5
Pryidylmercuric chloride	1	0.15	4
II. Chlorinated phenols			
Dowicide G	180	4	18
Nalco 21	750	8	120
Nalco 21-B	100	14	40
Nalco 21-M	400	6	18
Nalco 23	450	10	20
Santobrite	225	4	16
III. Detergents			
Emulsept E607 Special	400	140	1000
Nacconol FSNO	2000	18	1100
Roccal	200	7	700
IV. Composition either unknown or confidential			
Caso-Cide (Permacide Am-10)	40	15	180
Penetox	150	14	180
P.M. 32 Powder	14	1.4	16
Permatox 1-S	35	1.8	16
Ramplex C-106	23	4	40

The pH of the agar media was lowered to the predetermined values by the addition of sterilized *N* lactic acid. The pH was raised by the addition of sterilized *N* sodium hydroxide. The additions were made aseptically to previously sterilized agar media. The pH measurements were made with accuracy of ± 0.2 unit by means of a Hellige-Klett Comparator. The inconvenience of using the more precise glass electrode for pH determinations outweighed the gain in accuracy which would have resulted. For this reason, the color comparator method was used. The pH values were separated by large enough intervals to warrant the more approximate determinations of pH.

Having adjusted the pH of a batch of sterilized agar media, the procedures previously described for preparing various concentrations of a disinfectant in the Petri dishes and for the inoculation of the hardened agar plates were followed. In other words, the purpose was to observe the effect of only one variable —namely, the pH.

The testing procedure previously used for determining the inhibiting concentration included the same reference disinfectant which has served repeatedly as a tentative standard. The material used by Appling and McCoy *(11-13)* was a technical grade of phenylmercuric acetate. More recently, the Institute has obtained a recrystallized and chemically pure phenylmercuric acetate from the F. W. Berk Company. This product was checked repeatedly against the technical grade formerly used. In every case and for all three test organisms, the two grades of phenylmercuric acetate gave the same inhibiting concentrations. The recrystallized grade has, for obvious reasons, been used as the tentative standard. Each set of toxicity determinations included the significant concentrations of the tentative standard for the test organism used. The agar media were not adjusted for pH in these cases. These reference plates provided a reliable means of knowing whether or not the test organism was behaving similarly from one set of determinations to another. Consistent results for inhibiting concentrations were obtained repeatedly during the investigation of the effect of pH upon toxicity. It was assumed, therefore, that the data obtained at different times were entirely comparable.

The values for the inhibiting concentrations of Lignasan, Merfenel A, Dowicide G, and Roccal as a function of the pH are summaried in Tables II-V. The plates inoculated with *Aerobacter aerogenes* and those with *Bacillus mycoides* were incubated for 48 hours at 37°C. The plates inoculated with *Aspergillus niger* were incubated for 7 days at 30°C. The data in Tables II-V are shown graphically in Figs. 1-4.

The effect of pH on the toxicity of the four disinfectants can be seen readily by examining the graphs in Figs. 1-4. Prior to this, however, attention should be given to the effect of pH alone upon the growth of each of the test organisms. Only one of the three test organisms—namely, the mold *Aspergillus niger*—grew throughout the range of pH used (4 to 8.5). The

bacterial species *Aerobacter aerogenes* grew in the range of 5 to 8.5 and the other bacterial species *Bacillus mycoides* grew in a still smaller range, 6 to 8.5. These observations confirm previous ones—namely, that bacteria ordinarily do not grow readily at a pH lower than 5, whereas fungi (including molds) ordinarily are not restricted in growth by pH.

The effect of pH upon the toxicity of a disinfectant must be considered for each of the materials studied. The data for Lignasan (Fig. 1) show that the inhibiting concentration varied considerably, not only with the pH, but also with the test organism. This material was much more toxic over the entire range of pH toward *B. mycoides* and *A. niger* than toward *A. aerogenes*. The lowest value of inhibiting concentration for *B. mycoides* was 1.2 p.p.m. at a pH of 8.5. For *A. niger* it was 4 p.p.m. at a pH of 8.5 and for *A aerogenes* it was 10 p.p.m. at a pH of 7.

The data for Merfenel A (Fig. 2) resemble somewhat those for Lignasan. The former was considerably more toxic and, therefore, the lowest values of inhibiting concentrations were lower than those for Lignasan. Merfenel A was unusually toxic toward *B. mycoides* over the entire range of pH tested. The lowest inhibiting concentration (0.1 p.p.m.) for this organism was observed at a pH of 7. The lowest inhibiting concentration for *A. aerogenes* also was at a pH of 7, but the value was 1.0 p.p.m. In the case of *A. niger*, however, it was observed at a pH of 8.5 and the value was 0.5 p.p.m.

Dowicide G (Fig. 3) behaved very differently toward *A. aerogenes* than it did toward the other two test organisms. Previous data had also shown wide differences in inhibiting concentrations for the three organisms, with *A. aerogenes* as the most resistant of the three. Figure 3 shows that Dowicide G was remarkably toxic toward *A. aerogenes* at lower pH values. The lowest inhibiting concentration (10 p.p.m.) was at a pH of 5. A similar effect, but less pronounced, was observed for *A. niger*, for which the lowest inhibiting concentration of 12 p.p.m. was at a pH of 4. Dowicide G was most toxic toward *B. mycoides*, for which the lowest inhibiting concentration of 1.4 p.p.m. was found at a pH of 6.

TABLE II.—INHIBITING CONCENTRATIONS OF LIGNASAN

	Aerobacter aerogenes		*Bacillus mycoides*		*Aspergillus niger*	
pH	% by wt.	p.p.m.	% by wt.	p.p.m.	% by wt.	p.p.m.
4	*	*	*	*	0.0006	6
5	0.0040	40	*	*	0.0010	10
6	0.0070	70	0.0018	18	0.0016	16
7	0.0010	10	0.00016	1.6	0.0008	8
8.5	0.0026	26	0.00012	1.2	0.0004	4

* Does not grow at this pH.

TABLE III.—INHIBITING CONCENTRATIONS OF MERFENEL A

	Aerobacter aerogenes		*Bacillus mycoides*		*Aspergillus niger*	
pH	% by wt.	p.p.m.	% by wt.	p.p.m.	% by wt.	p.p.m.
4	*	*	*	*	0.0001	1
5	0.0002	2	*	*	0.0002	2
6	0.0004	4	0.00004	0.4	0.0002	2
7	0.0001	1	0.00001	0.1	0.0001	1
8.5	0.0004	4	0.00004	0.4	0.00005	0.5

* Does not grow at this pH.

TABLE IV.—INHIBITING CONCENTRATIONS OF DOWICIDE G

	Aerobacter aerogenes		*Bacillus mycoides*		*Aspergillus niger*	
pH	% by wt.	p.p.m.	% by wt.	p.p.m.	% by wt.	p.p.m.
4	*	*	*	*	0.0012	12
5	0.0010	10	*	*	0.0016	16
6	0.0045	45	0.00014	1.4	0.0040	40
7	0.0180	180	0.0004	4.0	0.0060	60
8.5	0.0350	350	0.0018	18.0	0.0060	60

* Does not grow at this pH.

TABLE V.—INHIBITING CONCENTRATIONS OF ROCCAL

	Aerobacter aerogenes		*Bacillus mycoides*		*Aspergillus niger*	
pH	% by wt.	p.p.m.	% by wt.	p.p.m.	% by wt.	p.p.m.
4	*	*	*	*	0.1200	1200
5	0.0200	200	*	*	0.0800	800
6	0.0200	200	0.0004	4	0.0800	800
7	0.0200	200	0.0007	7	0.0012	12
8.5	0.0020	20	0.0004	4	0.0004	4

* Does not grow at this pH.

TABLE VI.—PROPORTIONS OF SLURRY AND DISINFECTANT

Concentration of Disinfectant in Slurry, p.p.m.	Volume of Slurry, ml.	Volume of 0.1% Solution of Disinfectant, ml.
2	99.8	0.2
4	99.6	0.4
6	99.4	0.6
8	99.2	0.8
10	99.0	1.0

The fourth material, Roccal, behaved almost oppositely to Dowicide G. The inhibiting concentration for *A. aerogenes* and *A. niger* decreased as the pH increased. The lowest value for *A. aerogenes* was 20 p.p.m. at a pH of 8.5. In the case of *A. niger* the effect was even more startling because, at low pH values, very high concentration of Roccal were required to inhibit it. The lowest value was 4 p.p.m. at a pH of 8.5. The inhibiting concentration for *B mycoides* was only slightly affected by the pH. The minimum was 4 p.p.m. at pH values of 6 and 8.5.

The importance of pH in toxicity evaluations made in the laboratory is clearly shown in the data presented above. The effect of the pH varied, not only with the disinfectant but also with the test organism. The trends observed can be summarized as follows:

For Lignasan it was found that the toxicity against *A. aerogenes* was greatest at a pH of 7, whereas against *B. mycoides* and *A. niger* it was most pronounced at a pH of 8.5. It was much less toxic against the two bacterial test organisms at the lower pH values than at the higher ones.

For Merfenel A the toxicity against *A. aerogenes* and *B. mycoides* was greatest at a pH of 7, whereas against the mold *A. niger*, as in the case of Lignasan, it was greatest at a pH of 8.5. The toxicity appeared to decrease as the pH either increase or decreased from the value of 7.

For Dowicide G it was found that, against all three test organisms, the toxicity was greatest at the low pH values, the difference being most pronounced for *A. aerogenes*.

For Roccal the reverse was true—namely, the greatest toxicity against *A. aerogenes* and *A niger* was found at the high pH values. Although the toxicity of this material against *B. mycoides* was quite marked, it was only slightly affected by the pH.

Since the toxicity of the materials studied varied, not only with the pH but also with the test organisms, the implication of the results for mill systems appears quite obvious. The choice of an effective disinfectant will depend upon the pH of the mill system as well as the microorganisms to be inhibited. It should be emphasized in this connection that generalizations for the behavior of disinfectants in mill systems should not be made too hastily on the basis of the data presented. There is some justification for generalizing with respect to organic mercurials since the effect of the pH was quite similar for the two which were tested. However, in the cases of chlorinated phenolic compounds and detergents, one cannot be justified in assuming that the pH will affect the toxicity in all cases as it did for Dowicide G and Roccal. It is reasonable to expect that disinfectants containing sodium pentachlorophenate as the principal active ingredient will behave similarly to Dowicide G

and that those containing quaternary ammonium compounds will behave similarly to Roccal.

Laboratory Dosage of Mill Samples

Prior to and during pulp mill studies of the effectiveness of disinfectants for slime control, preliminary dosages in the laboratory were made on samples of slurry, white water, or white water sludge, depending upon the mill system. The procedure, which is described below in considerable detail, followed somewhat that used by King *(6)*. An adequate volume of slurry (or white water sludge) was obtained from the mill. Aliquots of 100 ml. were pipetted into 250-ml. Erlenmeyer flasks. From each flask an amount equal to the volume of the disinfectant solution to be added was removed by means of a sterile pipet. The desired amounts of disinfectant were then pipetted into the various flasks, bringing the volume to 100 ml. in each. To illustrate the proportions of slurry and disinfectant used, Table VI has been prepared.

After the addition of the disinfectant to the slurry, each flask was rotated to insure thorough mixing and then placed in an incubator whose temperature corresponded roughly to that of the mill system from which the slurry had been taken. The flasks were then sampled periodically to be plated for total bacterial counts. Bacto Nutrient Agar was used for plating and the plates were incubated for 48 hours at 37°C. One aliquot of 100 ml., containing no disinfectant and therefore serving as the control, was included to be sampled at the beginning (0 hours) and periodically with the other aliquots. Various periods of contact from 1 to 24 hours were used in the early runs and, finally, 6 hours' contact was selected to be representative of mill contact time and because it proved to be convenient for subsequent sampling.

It so happened that the co-operating mills were most interested in the use of organic mercurials and consequently the laboratory dosage data in Table VII were obtained by the use of three organic mercurials —namely, Lignasan (containing ethylmercuric phosphate), Merfenelope (containing phenylmercuric acetate), and Pyridose (containing pyridylmercuric acetate).

In order to apply laboratory dosage data to the mill system from which the slurry (or white water) sample had been taken, the authors arbitrarily decided to select as the probable minimum effective dosage that which caused a reduction in count of 99% after 6 hours of contact. This meant, of course, a survival of 1% of the initial count (0 hour values in Table VII). Several examples from the data in Table VII should clarify this point. Lignasan applied to white water sludge samples from groundwood pulp mill No. 1 was effective at a dosage level of 2 p.p.m. in causing a 95% kill and at a level of 4 p.p.m. in causing a 99.5% kill. One can readily locate these values of 2 and 4 p.p.m. without actually calculating the percentage kill. The initial count (0 hour value) was 17,000,000 and 1% survival (consequently a 99% kill) would be 170,000. It will be noted that this value is less than 840,000 (obtained at a dosage level of 2 p.p.m.) and greater than 79,000 (obtained at a dosage level of 4 p.p.m.). Therefore, the probable minimum dosage level should be greater than 2 but less than 4 p.p.m. of Lignasan for the mill system from which this white water sludge had been taken. Another example was Pyridose applied to another series of aliquots from the same white water sludge sample (the 0-hour and 6-hour values for the controls were identical). The 1% survival value was again 170,000 and this was less than 310,000 (obtained at a dosage level of 0.6 p.p.m.) but greater than 56,000 (obtained at a dosage level of 0.8 p.p.m.). In this case, therefore, the probable minimum dosage level should be greater than 0.6 but less than 0.8 p.p.m. for the mill system.

The data in Table VII also reflect similarities and differences in the behavior of a given organic mercurial or samples from different mill systems. Pyridose was used to determine the probable minimum effective dosage for each of three mill systems: two groundwood pulp mill systems and one board system. The values for the first and second fell between 0.6 and 0.8 for one and between 0.8 and 1.0 p.p.m. for the other. In the case of the filler slurry from the board mill system, however, the value fell between 1 and 10 p.p.m., being much closer to 10 than to 1 p.p.m. With Lignasan, the difference was even more pronounced between samples from two groundwood pulp mill systems. For mill No. 1 the probable minimum effective dosage fell between 2 and 4 p.p.m., whereas for mill No. 2 it was approximately 25 p.p.m. In the latter case, the 1% survival value was 14,300 and the highest dosage level of 25 p.p.m. gave a survival of 31,000 (approximately 1%).

The application of these probable minimum effective dosage rates will be discussed in the next section of this article which describes the mill studies made during 1946.

Paper and Pulp Mill Studies in Slime Control

In order to correlate laboratory toxicity data on disinfectants with the actual requirements of mill systems for such materials, various studies were conducted under mill operating conditions. It was rea-

TABLE VII.—LABORATORY DOSAGE OF MILL SAMPLES

Mill Sample	Disinfectant	Time, hr.	Counts per ml. at Dosage Indicated, p.p.m.							
			0	0.5	1.0	2.0	4.0	6.0	8.0	10.0
1. White water sludge (groundwood pulp mill No. 1)	Lignasan	0	17,000,000	.....	.....	.....	.....	.....	.....	.....
		6	32,100,000	13,800,000	4,500,000	840,000	79,000	33,000	24,000	14,000
			0	5.0	10.0	15.0	20.0	25.0		
2. White water (groundwood pulp mill No. 2)	Lignasan	0	1,430,000	.....	.....	.....	.....	.....	.....	.....
		6	7,500,000	5,400,000	3,000,000	640,000	72,000	31,000	.....	.....
			0	0.2	0.4	0.6	0.8	1.0		
3. White water sludge (groundwood pulp mill No. 1)	Merfenelope	0	17,000,000	.....	.....	.....	.....	.....	.....	.....
		6	32,100,000	10,200,000	11,400,000	5,100,000	3,700,000	3,570,000	.....	.....
			0	0.2	0.4	0.6	0.8	1.0		
4. White water sludge (groundwood pulp mill No. 1)	Pyridose	0	17,000,000	.....	.....	.....	.....	.....	.....	.....
		6	32,100,000	5,600,000	1,100,000	310,000	56,000	39,000	.....	.....
			0	0.1	0.2	0.4	0.6	0.8	1.0	2.0
5. Groundwood slurry 1% (groundwood pulp mill No. 1)	Pyridose	0	6,000,000	.....	.....	.....	.....	.....	.....	.....
		6	13,700,000	15,100,000	10,800,000	2,610,000	192,000	43,000	125,000	2,000
			0	0.01	0.1	1.0	10.0			
6. Filler slurry (board mill)	Pyridose	0	62,000,000	.....	.....	.....	.....	.....	.....	.....
			170,000,000	166,000,000	156,000,000	36,000,000	380,000	.....	.....	.....
			0	25	50	75	100	150	200	250
7. White water (groundwood pulp mill No. 2)	Santobrite	0	522,000	.....	.....	.....	.....	.....	.....	.....
			540,000	430,000	110,000	85,000	30,000	14,300	6,300	5,000

lized that a larger number of variables would be encountered; however, their full import was not realized at the outset. As the various studies proceeded, these variables not only became more apparent, but their control or elimination became all the more desirable. The studies described in this section will be given under the classification of the mills which co-operated.

Kraft Paper Mill

In the past, this mill had obtained satisfactory control of slime using Lignasan at the rate of 2 ounces per ton (dry fiber basis); consequently, it was decided to initiate the study at that rate of dosage. It should be emphasized at this point that no work on laboratory dosages was started until months later when slime control studies were initiated in groundwood pulp mill No. 1. The authors had no basis upon which to determine effective mill dosage levels except the recommendations of the manufacturers of slime control agents and mill practice which was usually based upon the former. It was planned, therefore, to initiate the study in this first mill at the rate of 2 ounces per ton and to vary this rate in order to determine the minimum effective dosage as soon as possible. From the standpoint of mill operation it was necessary to determine whether or not the minimum effective dosage of Lignasan was an economical one for them to use.

For this study two paper machines were selected, one being treated with Lignasan and the other serving as a control. In all cases the Lignasan was added at the beaters at the rate which was calculated to give the desired dosage. Comparable points for each machine were sampled and plated for bacterial counts. At first samples were taken daily from the headbox, the headbox showers, the saveall, the beaters (before Lignasan was added,) and the raw screened water. Later, samples of the headbox showers and the raw screened water were eliminated from the sets of samples because they were considered unnecessary. The samples were plated with Bacto Dextrose Agar [which, incidentally, was comparable with that used by King (*6*)] and the plates were incubated at 23° C. because the first runs had been plated for incubation at 23° C. and 37° C. with higher counts resulting at 23° C.

The study began April 1, 1946 by the application of Lignasan at the rate of 2 ounces per ton (dry fiber basis) on one of the paper machines. This dosage rate was applied for a period of 2 weeks during which time daily samples were taken from both machines as previously explained. The dosage rate on the one machine was then reduced to 1 ounce per ton for the following 2 weeks. During this period the treatment of all slush stock stored over the weekend shut-down at the rate of 4 ounces per ton was started. Since all the slush stock was treated at those times, both paper machines under study had approximately the same bacterial content at the beginning of the week.

For the following 5 weeks the dosage rate on the one machine was further reduced to 0.5 ounce per ton (one fourth of the initial rate). As previously, all slush stock stored over the weekend was treated at the rate of 4 ounces per ton. One week of no treatment with Lignasan followed the rate of 0.5 ounce per ton. The study was then suspended until August.

During the 10 weeks briefly recorded above, many variables were encountered which did not make the operation on the two paper machines as comparable as was desired. Some of the variables noted were: changes in pH, difference in paper weight, amount of broke used, introduction of dyes, and use of partially bleached stock in which chlorine residuals in the neighborhood of 1500 p.p.m. were present in the beaters. It is probable that unnoticed variables also affected the study of Lignasan as a slime control agent in this mill system. Since these factors had a considerable effect upon bacterial counts of the system, it was very difficult to draw any conclusions regarding the effect of the various dosage levels of Lignasan as compared with no treatment at all. In some cases, however, it was obvious that the Lignasan had lowered the bacterial counts. After all parties concerned had thoroughly discussed the status of this mill study, it was decided to make a second study at times when both machines were producing the same grades of paper, even though the dosage levels might have to be run at widely separated times.

Accordingly, on August 26, work was again resumed in this mill with the same two paper machines. Daily counts were made on samples taken from the headbox, the beaters (before Lignasan was added), and the slush broke beater. No treatment with Lignasan was used during the first week. The pH varied somewhat during this week. On October 7, both machines were again making the same paper and one machine was treated with Lignasan (at the beaters) at the rate of 4 ounces per ton (dry fiber basis) and the other at the rate of 8 ounces per ton. The slush broke was treated at the latter rate. These treatments lasted 1 week. The bacterial counts were low with the exception of those for the slush broke which was usually high in spite of the treatment with Lignasan. The third and last week of this study was begun on October 28. The treatments with Lignasan during the week of October 7 were reversed on the two machines. The bacterial counts showed more clearly the effect of the increased dosage of Lignasan than did those of the previous week. In general, the pH varied only slightly on both machines.

None of the bacterial counts obtained at this mill are reported in this article because there were such large variations. As previously stated, some of these variations could be explained but others could not.

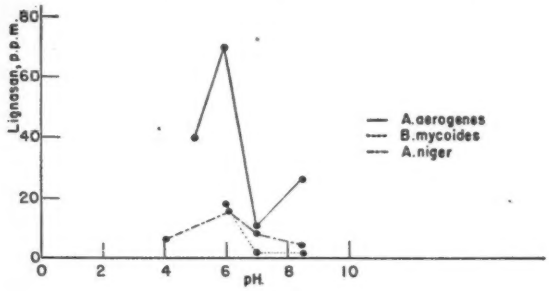

Fig. 1

Variation of the Inhibiting Concentration of Lignasan with pH

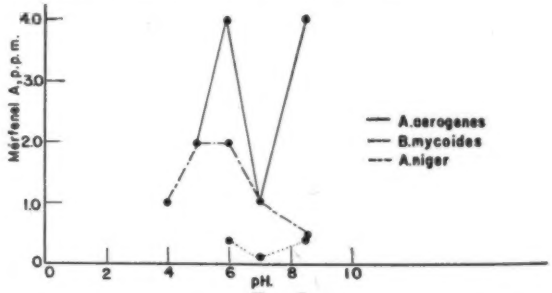

Fig. 2

Variation of the Inhibiting Concentration of Merfenel A. with pH

This was still true for the second study, although the variables had been reduced to a minimum. The two weeks of operation during October were more comparable than either week in October was with the week in August.

It was difficult to state whether better slime control was experienced during the various treatments as judged by visible evidence of slime. It appears as though this mill did not experience any real slime problem during 1946 and this statement is based partly on the opinion of the authors and partly on that of the mill personnel.

Because of the distance of the mill from the Institute, it was impractical for the authors to do much of the actual sampling and plating after the work had been initiated on April 1. An able technician at the mill continued the sampling and plating under the remote supervision of the authors, who gratefully acknowledge not only his interest and co-operation, but also that of the mill management concerned.

Book Paper Mill

In the past this mill has also used Lignasan; however, the dosage rate was higher than that used in the kraft mill. The practice in this mill was to add 8 ounces of Lignasan to every other beater and this roughly corresponded to a dosage rate of 4 ounces per ton (dry fiber basis.) Here, again, the initial rate for the contemplated study was the one which was in use. Samples were taken from the headbox, headbox showers, white water sludge, raw water, and chlorinated water. These samples were taken from three to five times per week. They were plated with Bacto Dextrose Agar and the plates were incubated for 48 hours at 37° C., after ascertaining that this temperature gave higher counts than incubation at 23° C.

Two paper machines were selected, one for treatment with Lignasan and the other for no treatment. Treatment began on April 15 and the study ended June 29. During the first 3 weeks the dosage rate was 4 ounces per ton. This was increased to 8 ounces per ton for 2 weeks and then reduced to 4 ounces for 1 week. The Lignasan treatment was them discontinued.

As in the case of the kraft paper mill, the fluctuations in bacterial count were not always understood. However, there was a pronounced lowering of the bacterial counts when 8 ounces per ton were added, which did not occur at the rate of 4 ounces per ton. Such factors as the amount of bleached groundwood in the furnish and the use of fresh water with a chlorine residual in the headbox showers instead of white water produced decided drops in bacterial content. Although every attempt was made to obtain comparable furnishes and operations with both machines, some discrepancies arose; however, with a better understanding of the factors involved, Pyridose was substituted for Lignasan for several weeks study during the summer.

The dosage rates were 0.5 and 1.0 ounces per ton (dry fiber basis) added at the beaters as in the case of Lignasan. Three paper machines were included in the Pyridose series of treatments, one of the three serving as a control. One of the other two machines was treated at the rate of 1.0 ounce per ton and the other at the rate of 0.5 ounce per ton. After 1 week of these treatments, they were reversed on the two machines. The treatments were preceded by 1 week of sampling while no Pyridose was added on any of the three machines. In effect, there were two complete sets of data which included one week of no treatment, 1 week using 1.0 ounce of Pyridose per ton, and 1 week using 0.5 ounce of Pyridose per ton. The bacterial counts were again inconclusive, in that they did not decrease in a consistent manner because of increased dosage rates. Furthermore, observations of the paper machines by the mill personnel during the weekly clean-up periods did not reveal any greater degree of cleanliness when Pyridose was used than when it was not used. It is only fair to state that there was no appreciable slime trouble on any of the machines during the course of the treatments either with Lignasan or Pyridose. Neither was there any appreciable slime trouble on the machines which had no treatment with either disinfectant. In other words, this mill did not have a serious slime problem during the period of study.

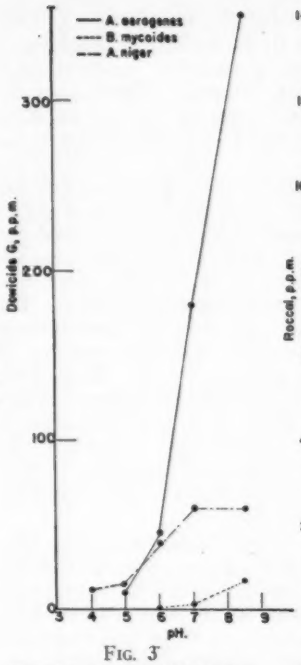

Fig. 3
Variation of the Inhibiting Concentration of Dowicide G with pH

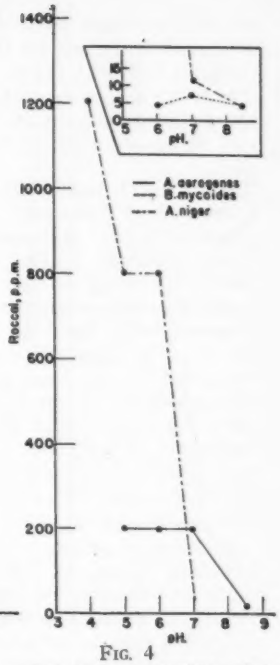

Fig. 4
Variation of the Inhibiting Concentration of Roccal with pH

As in the case of the kraft paper mill, no bacterial counts are reported from this mill in this article because of the great variation in the counts obtained.

It is realized that, for a slime control agent to be effective, it must be effective under various conditions of paper machine operation; however, in order to evaluate the efficiency of any given disinfectant, controlled testing conditions are essential. In the face of the uncertain control of paper machine operation in two different mills, it was decided to suspend work in paper mills unless an indisputable slime problem was evident. It was also decided to limit such studies to those few paper machines which constantly produced the same grade of paper so that the probability of variables, other than the rate of dosage of the slime control agent, would be extremely small. The authors have related their experiences in these two mills primarily to describe the difficulties which they encountered and to help clarify some of the factors which must be considered when slime control is to be studied under mill operating conditions.

Groundwood Pulp Mill No. 1

Because of the many variables and lack of well-defined slime problem in the two paper mills discussed above, the authors decided to focus their attention on

groundwood pulp mills for the remainder of 1946. Two mills were selected in the vicinity of Appleton to facilitate frequent sampling and close supervision of dosage rates of slime control agents. These mills differed considerably in their capacity and operation, as will be apparent in the brief descriptions given for each.

Mill No. 1 has a much more elaborate groundwood system than mill No. 2, partly because of its greater capacity and partly because of its need for greater tonnage. The retention time of pulp from the time of grinding to its actual use in the paper machines was estimated at approximately 12 hours. The temperature of the mill system was approximately 50° C. The capacity of this mill is 50 tons per 24 hours and it is operated 6 days per week. This schedule permits regular and thorough wash-ups at which times the accumulated slime of 6 days' operation is eliminated. Chlorinated fresh water replaces the white water after the wash-up and the mill personnel makes a conscious effort to reduce slime through good housekeeping practices.

In order to obtain a logical basis for determining the initial dosage rate of Pyridose (pyridylmercuric acetate) to be applied for slime control in this mill system, the authors determined the probable minimum effective dosage in the laboratory. The procedure for this was described earlier in this article and it will suffice at this point to refer to Table VII in which three organic mercurials were compared simultaneously by observing their respective effects on portions of the same mill sample. Mill samples 1, 3, and 4 of Table VII were really one sample as the 0- and 6-hour counts or the control indicate. Calculations of the probable minimum effective dosages for Lignasan, Merfenelope and Pyridose gave 4, greater than 1 (but actualy undetermined), and 0.8 p.p.m., respectivelv. Thus, the probable minimum effective dosage of 0.8 p.p.m. of Pyridose was selected and, with the aid of the technical staff of the mill, this dosage was translated directly to the initial mill dosage of 5 ounces per ton of fiber (dry basis). It was decided to apply this dosage at the grinders for spruce wood and to distribute it uniformly throughout the daily grinding schedule. The particular grinder selected was one which allowed mixing of the treated stock with the untreated stock as soon as possible.

Prior to initiating the mill dosage, daily observations slime formation were made and, simultaneously, samples were taken from the grinder, white water introduced after the grinder, screens, deckers, regulating tank, and white water sludge. The weekly wash-ups referred to previously removed all visible slime from the equipment, so that no slime was present when the grinding was resumed. Normally, slime appeared rapidly and this was verified during the week prior to the dosage with Pyridose. After 24 hours of grinding, the equipment had a decided slippery feel and, after 48 hours, considerable slime had formed. (It was impossible to evaluate the quantity of slime formed,) so that the build-up after 48 hours was undetermined, although various observers had the impression that there was no further increase in slime during the remainder of the week. The samples for bacterial counts were plated with Bacto Dextrose Agar and the plates were incubated 48 hours at 37° C. Several platings had been previously incubated at 23° C. and 37° C. to determine the better incubation temperature. It is believed that the bacterial counts from both groundwood pulp mills have considerable significance and, for this reason, representative sets of data have been incorporated in this article. The data for the week prior to dosage with Pyridose in mill No. 1 are given in Table VIII. The sampling time was approximately the same each day—namely, 10:00 A. M. In general, the data reflect a rapid increase in bacterial counts (ten to fifty-fold increases) during the first 24-hours of grinding. However, after this increase the counts were fairly uniform for the remainder of the week. This same pattern has been repeatedly observed in both pulp mills. It correlates roughly with the appearance of slime, which seemed to have reached its maximum deposition by the end of 48 hours of grinding following the weekly wash-up period.

TABLE VIII.—BACTERIAL COUNTS IN GROUNDWOOD MILL NO. 1 WITHOUT PYRIDOSE

	Sampling Points					
Date Sampled	Grinder	White Water at Grinder	Screens	Decker Stock	Regulating Tank *	White Water Sludge
	Number of Bacteria per ml.					
Sept. 3	190,000	83,000	94,000	110,000	1,260,000	.....
Sept. 4	2,200,000	2,460,000	2,650,000	5,200,000	15,700,000	13,000,000
Sept. 5	610,000	2,000,000	2,100,000	2,300,000	8,700,000	11,000,000
Sept. 6	1,200,000	2,900,000	2,300,000	3,900,000	21,300,000	14,300,000
Sept. 7	2,100,000	1,900,000	2,000,000	3,200,000	26,500,000	16,500,000

* Counts expressed as bacteria per gram of wet stock—stock, 5% consistency.

On September 9, the Monday of the week following the preliminary observations on slime formation and changes in bacterial counts, Pyridose at the rate of 5 ounces per ton (dry fiber basis) was added at the grinders to insure disintegration of the envelopes and prompt mixing with the freshly ground spruce wood. Daily observations for slime formation on the equipment were made and daily samples for bacterial counts were taken from the sampling points previously stated. The same plating and incubating conditions were used throughout the study for this mill. The bacterial counts for the week of Pyridose treatment are given in Table IX. Again the counts were much lower at first than they were 24 hours later (Sept. 10); however, they were not uniformly lower than those for Sept. 3, which reflected the effect of the weekly wash-up period. The counts after 24 hours of grinding were noticeably lower than those for the preceding week of no treatment with Pyridose and they continued to remain at this lower level during the treatment period. It should be emphasized that the mill dosage level did not result in 99% killing as did the probable minimum effective dosage in the laboratory. Had this occurred, the values in Table IX would have been in the range of 50,000 to 200,000. There was much less slime formation and it was delayed at least 24 hours in its appearance. The slime changed somewhat in its nature which indicated a selective inhibitory action, repressing some types but not others.

A second attempt at slime control was planned to determine the effect of spacing the dosage at longer intervals than those used during the week beginning Sept. 9. Upon the recommendation of the manufacturers of Pyridose, this material was added at 8-hour intervals in the following amounts: *(a)* at 7:00 A. M. 9 ounces at the grinders and 1 ounce to the refiner system; *(b)* at 3:00 P. M. 4 ounces at the grinders and 1 ounce to the refiner system; and *(c)* at 11:00. P. M. the same additions as at 3:00 P. M. This dosage rate was equivalent to 2.5 ounces per ton (dry fibre basis) and it was continued from November 15 through November 23, at which time a regular wash-up was made, followed by a flushing out of the system with chlorinated fresh water treated with Pyridose to give a residual of 0.4 p.p.m. The chlorinated fresh water introduced to replace the white water

was likewise treated with Pyridose to give a residual of 0.4 p.p.m. When grinding was resumed on November 25, Pyridose was again added at 8-hour intervals in the manner indicated above. Observations and samplings were made November 25, 27, 29, and 30. The treatment was discontinued on November 30.

The bacterial counts for the 2 weeks period are given in Table X. A comparison with Tables VIII and IX shows that the counts on November 16 and 25 (immediately following wash-ups) were considerably lower than those for the days following. This was generally true for mill No. 1. The counts for November 18-23 were roughly of the same magnitude as those given in Table VIII for a week of no treatment with Pyridose. Those for November 27-30, however, were markedly lower than those for any other week. The counts steadily increased during this week but the level reached prior to the wash-up was much lower than for any other week. The effect of the Pyridose added to the chlorinated fresh water during and after the wash-up on November 24 appeared to have continued throughout the entire week.

At the beginning of the second attempt to control slime with Pyridose in this mill, the system was completely and thoroughly cleaned. Previously, slime had appeared in large amounts within 48 hours from the time grinding was resumed. Slime in comparable amounts did not appear until after 96 hours of grinding. The nature of the slime was altered and it was less adherent than previously. The wash-up crew experienced much less trouble in removing the slime from the equipment on November 24 and 31 than when no Pyrdiose had been used. A microscopic examination of the slime was made from time to time. During this period the slime was composed of many bacteria with small capsules and many others without capsules. Fungi were absent. During the week of November 25-30, the bacterial counts were much lower than any previous week; however, the amount of slime on the equipment was almost as great and the build-up was nearly as rapid as during weeks of no treatment. The nature of the slime continued to be altered and essentially the same as that for the preceding week.

Groundwood-Pulp Mill No. 2

It was stated previously that this mill differed from No. 1 on the basis of a much smaller tonnage produced and in the manner of its operation. The time lag between grinding and use of the stock on the paper machines was much less than in mill No. 1. Furthermore, the system was not cleaned weekly but every 4 or 5 weeks. Make-up white water was obtained from the re-worked telephone book stock system.

Prior to the introduction of any slime control agent in this mill system, daily observations and samplings were made for one week (September 23-28). Samples were taken from the grinders, white water at grinders, knotter headbox, rifflers, screens, and deckers. These

TABLE IX.—BACTERIAL COUNT IN GROUNDWOOD MILL NO. 1 WITH THE ADDITION OF PYRIDOSE AT 1 HOUR INTERVALS

Date Sampled	Sampling Points: Grinder	White Water at Grinder	Screens	Decker Stock	Regulating Tank *	White Water Sludge
	Number of Bacteria per ml.					
Sept. 9	41,000	107,000	35,000	9,000	3,400,000	.....
Sept. 10	870,000	1,010,000	670,000	810,000	8,100,000	6,200,000
Sept. 11	159,000	1,130,000	750,000	1,650,000	21,000,000	14,500,000
Sept. 12	145,000	470,000	810,000	500,000	4,800,000	20,700,000
Sept. 13	430,000	610,000	730,000	73,000	7,300,000	.....

* Counts expressed as bacteria per gram of wet stock—stock, 5% consistency.

TABLE X.—BACTERIAL COUNTS IN GROUNDWOOD MILL NO. 1 WITH THE ADDITION OF PYRIDOSE AT 8 HOUR INTERVALS

Date Sampled	Sampling Points: Grinder	White Water at Grinder	Decker Stock	Refiner Thickener Stock
	Number of Bacteria per ml.			
Nov. 16	1,150,000	480,000	320,000	580,000
Nov. 18	570,000	1,710,000	1,870,000	2,030,000
Nov. 19	.....	1,660,000	1,310,000	2,150,000
Nov. 20	294,000	1,270,000	1,440,000	1,660,000
Nov. 21	520,000	670,000	990,000	2,380,000
Nov. 23	2,020,000	2,420,000	2,170,000	3,100,000
Nov. 25	16,700	18,000	20,000	.....
Nov. 27	52,000	142,000	171,000	214,000
Nov. 29	44,000	295,000	380,000	850,000
Nov. 30	231,000	270,000	990,000	1,950,000

TABLE XI.—BACTERIAL COUNTS IN GROUNDWOOD PULP MILL NO. 2 WITHOUT TREATMENT

Date Sampled	Sampling Points: Grinder	White Water at Grinder	Knotter Headbox	Riffler	Screens	Decker *
	Number of Bacteria per ml.					
Sept. 24	22,000	2,020,000	1,480,000	1,240,000	1,400,000	5,100,000
Sept. 25	158,000	4,500,000	3,150,000	2,210,000	1,860,000	11,600,000
Sept. 26	54,000	6,600,000	4,500,000	3,000,000	4,700,000	8,400,000
Sept. 27	9,800	5,500,000	6,100,000	5,000,000	4,300,000	8,000,000
Sept. 28	13,900	740,000	800,000	550,000	460,000	6,000,000

* Count per gram of wet stock.

were plated with Bacto Dextrose Agar and incubated at 37° C. for 48 hours (after having previously found that this temperature was more suitable than 23° C.) The counts for this week without treatment are given in Table XI. It will be noted that the grinder samples were consistently much lower in bacterial content than any of the other samples during the week. This is in sharp contrast to the situation found in mill No. 1 without treatment, where the counts from all sampling points were much lower on Monday than during the rest of the week. However, the grinder samples from mill No. 1 were usually the lowest in bacterial content for the daily sets but not for the rest of week. It may be that this contrast resulted from differences in operating conditions. It will be remembered that mill No. 1 had regular weekly wash-ups, whereas No. 2 had them every 4 to 5 weeks.

The highest counts in Table XI were obtained from the decker samples and the next highest ones were usually from the white water samples. The daily differences between the counts at the grinders and those at the other sampling points was undoubtedly caused by the addition of white water, whose bacterial content was invariably much higher than that of the grinder stock. Consequently the white water was selected as the most convenient sample for studying the effect of a slime control agent upon the bacterial content of this mill system. The authors determined the probable minimum effective dosage of Lignasan by the laboratory method described earlier in this paper. The data in Table VII for mill sample 2 indicated that 25 p.p.m. of Lignasan was the probable minimum effective dosage.

In order to apply the above value to the mill system, it was necessary to calculate the dosage rate required for adding this material to the white water of the mill system in order to have 25 p.p.m. present. The total volume of white water (including that from the reworked telephone book stock system and designated hereafter as "Retel" white water) in the system at any one time was estimated to be 20,000 gallons and total daily loss of white water was estimated to be approximately 50,000 gallons. This loss was continuously made up by the introduction of "Retel" white water, and fresh water. Since the probable minimum effective dosage as determined in the laboratory was 25 p.p.m., it was decided to double this value for the initial mill dosage rate. This was done to com-

pensate for the uncertain and irregular white water losses. The initial daily dosage, therefore, was 8 pounds of Lignasan added at 7:00 A. M. and 23 pounds added in 1-pound amounts once every hour, making a total of 31 pounds for each 24 hours. Since the tonnage ground was approximately 17 during this period of treatment, the dosage rate was approximately 1.8 pounds of Lignasan per ton (dry fiber basis). Incidentally, the volume of white water in the system did not change materially when larger tonnages were ground; consequently the treatments were always based upon the volume of white water rather than the tonnage of wood ground.

Beginning October 14, a series of eight treatments was initiated to study the effect of adding Lignasan at different dosage levels. The series ended 8 weeks later. The variations in dosage level were determind largely on the basis of information obtained regarding Lignasan residuals. The initial treatment was selected with the idea of maintaining a constant residual of Lignasan, since 8 pounds were supposed to give a residual of 50 p.p.m. immediately and 1 pound per hour was supposed to replace that lost through the white water. A new method for determining residuals of disinfectants in mill samples has been developed by the authors who have repeatedly demonstrated its simplicity and usefulness. For the first time in the study of slime control, a simple and rapid method for determining such residuals in mill systems has been used. The implication of this may be far-reaching, because many present uncertainties in dosage rates cannot be solved until an adequate knowledge of residuals is obtained. Details of this method will be published elsewhere; however, the authors wish to emphasize at this point that dosage rates of Lignasan were altered systematically in this mill system on the basis of Lignasan residuals determined for a large number of samples and on the basis of slime formation on mill equipment.

In order to present a clearer picture of the variation in dosage rates during the 8-weeks period in which Lignasan alone was used as the slime control agent in mill No. 2, Table XII has been prepared. The maximum time observed for the duration of continuous Lignasan residual for four treatments is included in the same table. The data for residuals indicate the following, *(a)* that they were present for the longest time periods during the latter part of the eighth week of treatment; and *(b)* that residuals were probably absent most of the time in all treatments.

Three sources of information were used to evaluate the approximate degree of slime control for the various dosage rates applied. They were as follows: *(a)* Lignasan residuals in the mill system; *(b)* bacterial counts for from two to six sets of samples per week; and *(c)* regular observations of slime formation on a marked section of the rifflers which was usually cleaned at the beginning of each week. The use of Lignasan residuals has already been discussed briefly. Representative bacterial counts for the 8-weeks period beginning October 14 and ending December 7 are given in Table XIII. In addition the sampling time for each set of four samples with reference to the nearest time of adding 6 or more pounds of Lignasan is given. Several interesting dependences of counts upon dosage rate may be noted in this table. For example, the lowest counts for the entire 8-weeks' period were obtained during the week beginning November 25 at which time the dosage rate was 30 pounds per 24 hours (added in 10-pound amounts at 7:00 A. M., 9:00 A. M. and 11:00 A. M.). By referring to Table XII it can be seen that the rifflers were cleaned on November 26 after which there was a very slight build-up of slime until December 4. Another example of dependence of counts upon dosage rate can be seen in the two sets of data for October 17. The counts for the set of four samples taken 7 hours after 8 pounds of Lignasan had been added were considerably higher than those for the set taken 5 hours earlier and, therefore, nearer to the time when Lignasan residuals were present in the system. Data for three sets of samples taken on October 22 showed little if any dependence of counts upon the time of dosage with Lignasan.

Regardless of the trends in Lignasan residuals and their probable effect on bacterial counts, the most convincing evidence for or against slime control in mill No. 2 was obtained by observing regularly the formation of slime on a marked section of the rifflers. The observations for the 8-weeks' period have been summarized in Table XII. The treatment with Lignasan, which was initiated on October 14, followed one of the infrequent general clean-up periods in this mill system. The record shows that there were various weeks with very slight build-ups of slime. For example, during the week beginning October 21 when three daily doses of 16, 8, and 8 pounds were spaced at 8-hour intervals, there was very slight formation of slime. On the other hand, three daily doses of 6 pounds each, spaced at 8-hour intervals during the week beginning November 11, were accompanied by a large build-up of slime. When the spacing between doses was reduced from 8 to 2 hours and finally to 1 hour during the weeks beginning November 25 and December 2, there was only a slight build-up of slime. By this time it must be obvious that Tables XII and XIII must be studied simultaneously to perceive the real relationships between the three sources of information which have been assembled for the purpose of determining the minimum effective dosage of Lignasan in mill No. 2. The dependence upon bacterial counts alone has proved misleading, since they are very difficult to interpret in terms of slime control. The use of Lignasan residuals in the mill system proved invaluable in determining the direction of dosage rates (both the quantity added and the spacing of the amounts added.) The most effective periods of control with Lignasan, as judged by the marked reduction in slime formation in the rifflers,

TABLE XII.—DOSAGE RATES OF LIGNASAN WITH CORRESPONDING RESIDUALS AND SLIME FORMATION

Week Starting	Daily Dosage Rate, pounds	Maximum Duration Observed for Continuous Residual (minutes)	Slime Formation on Marked Section of Rifflers
Oct. 14	8 at 7:00 A.M. and 1 per hour thereafter	.....	Very slight on Oct. 14, 15; more on Oct. 16; much on Oct. 17
Oct. 21	16 at 7:00 A.M.; 8 at 3:00 P.M.; 8 at 11:00 P.M.	.....	Very slight from Oct. 22-26
Oct. 28	8 at 7:00 A.M.; 8 at 3:00 P.M.; 8 at 11:00 P.M.	30 (after 7:00 A.M. addition)	Slight from Oct. 23-Nov. 2
Nov. 4	8 at 7:00 A.M. and 1 per hour thereafter	75 (after 7:00 A.M. addition)	Slight on Nov. 4; large increase by Nov. 9
Nov. 11	6 at 7:00 A.M.; 6 at 3:00 P.M.; 6 at 11:00 P.M.	.....	Large increase from Nov. 11-16
Nov. 18	10 at 7:00 A.M.; 10 at 3:00 P.M.; 10 at 11:00 P.M.	.....	Slight on Nov. 20; large increase by Nov. 23
Nov. 25	10 at 7:00 A.M.; 10 at 9:00 A.M.; 10 at 11:00 A.M.	.....	Rifflers cleaned Nov. 26; no slime Nov. 27; very slight Nov. 30
Dec. 2			
(a) Dec. 2-3	10 at 7:00 A.M.; 10 at 9:00 A.M.; 10 at 11:00 A.M.	75 (after 11:00 A.M. addition)	Slight on Dec. 2; moderate on Dec. 4
(b) Dec. 4-7	10 at 7:00 A.M.; 10 at 8:00 A.M.; 10 at 9:00 A.M.	135 (after 7:00 A.M. addition)	Rifflers cleaned on Dec. 5; slight on Dec. 7

was during the weeks beginning October 21, October 28, November 25 and December 2. The dosage rates used during these periods were based upon previous data for Lignasan residuals. It was decided to reduce the time spacing between addition of Lignasan in order to increase the span of a continuous Lignasan residual at the expense of not having any residual during the greater part of the 24 hours.

After 4 weeks of various treatments as outlined in Table XII, it appeared probable that Lignasan might not completely eliminate the slime from this mill. A marked change in the nature of the slime by that time suggested the establishment of microflora which tolerated the Lignasan dosages being applied. It became highly desirable to include in this study a period of treatment in which Lignasan alternated with a different type of disinfectant. Santobrite (containing sodium pentachlorophenate) was selected as the second disinfectant. The E. I. duPont de Nemours Co. supplied the Lignasan X and the Monsanto Chemical Co. supplied the Santobrite for this part of the study.

Using the laboratory method described earlier in this article, the authors determined the probable minimum effective dosage of Santobrite to be 200 p.p.m. (see Table VII, mill sample 7). In terms of mill dosage, based upon white water volume and losses, this was equivalent to 32 pounds of Santobrite. Since it had been decided to alternate Santobrite with Lignasan, the quantities available made it necessary to use two additions of Lignasan to one of Santobrite. The daily dosage for the period of December 9-21 was as follows: *(a)* 10 pounds or Lignasan at 7:00 A. M., *(b)* 32 pounds of Santobrite at 3:00 P. M.; and *(c)* 10 pounds of Lignasan at 11:00 P. M. Observations of slime formation on a marked section of the rifflers were made regularly. Samples were taken regularly for bacterial counts and these are summarized in Table XIV. The magnitude of these counts was roughly comparable, particularly those for the week beginning December 16, with that encountered during the lowest level with Lignasan alone (see Table XIII for week beginning November 25.) The counts for the week beginning December 9 were irregular in magnitude; however, those for the following week were remarkably constant. The data for December 12 appear particularly significant, because the bactericidal effect of Santobrite (which was added 2.75 hours prior to the sampling in the afternoon) seems to have leveled off all counts to a range which was maintained throughout the last week.

Observations of slime formation on the marked section of the rifflers revealed a very slight build-up of slime during the week beginning December 9. As a matter of fact, the rifflers were cleaned out on December 10. On December 18, there was an increase in slime for December 16-18 and a large amount was present on December 21. All treatments in this mill were discontinued after the last set of samples was taken on December 21.

TABLE XIV.—BACTERIAL COUNTS IN GROUNDWOOD PULP MILL NO. 2 DURING A PERIOD WHEN LIGNASAN WAS ALTERNATED WITH SANTOBRITE

Sampling Time			Sampling Points			
Date	Hr. after Adding Disinfectant		Grinder	White Water at Grinder	Riffler	Screen
			No. of Bacteria per ml.			
Dec. 9	4 hr. after 10 lb.	(1)	300,000	1,020,000	870,000	930,000
Dec. 10	2.5 hr. after 10 lb.	(1)	380,000	1,370,000	1,540,000	2,490,000
Dec. 11	2 hr. after 10 lb.	(1)	370,000	1,790,000	730,000	850,000
Dec. 12 (a)	3 hr. after 10 lb.	(1)	298,000	1,150,000	450,000	840,000
(b)	2.75 hr. after 32 lb.	(2)	300,000	550,000	450,000	480,000
Dec. 14	2.25 hr. after 10 lb.	(1)	550,000	2,140,000	1,710,000	1,920,000
Dec. 16	2.25 hr. after 10 lb.	(1)	390,000	580,000	420,000	600,000
Dec. 18	2 hr. after 10 lb.	(1)	340,000	410,000	420,000	420,000
Dec. 21	2 hr. after 10 lb.	(1)	102,000	720,000	480,000	650,000

(1) Lignasan (2) Santobrite

TABLE XIII.—BACTERIAL COUNTS IN GROUNDWOOD PULP MILL NO. 2 AT VARIOUS DOSAGE LEVELS OF LIGNASAN

Sampling Time			Sampling Points			
Date	Hr. After Adding Lignasan		Grinder	White Water at Grinder	Riffler	Screen
			No. of Bacteria per ml.			
Oct. 14	6.5 hr. after 8 lb.		243,000	1,100,000	810,000	1,440,000
Oct. 15	1.25 hr. after 8 lb.		68,000	31,000	24,600	47,000
Oct. 16	2.45 hr. after 8 lb.		6,400	760,000	910,000	1,050,000
Oct. 17 (a)	2 hr. after 8 lb.		160,000	800,000	340,000	680,000
(b)	7 hr. after 8 lb.		610,000	3,380,000	2,700,000	2,480,000
Oct. 22 (a)	2 hr. after 16 lb.		17,900	3,460,000	1,710,000	1,780,000
(b)	4 hr. after 16 lb.		840,000	2,310,000	1,670,000	1,350,000
(c)	7.5 hr. after 16 lb.		74,000	5,300,000	2,320,000	3,200,000
Oct. 23	2 hr. after 16 lb.		2,140,000	3,940,000	2,470,000	2,670,000
Oct. 24	2 hr. after 16 lb.		83,000	6,700,000	2,500,000	4,600,000
Oct. 26	2 hr. after 16 lb.		19,600	3,600,000	2,620,000	3,200,000
Oct. 28	2 hr. after 8 lb.		6,000	17,000,000	9,900,000	12,100,000
Nov. 2	2 hr. after 8 lb.		19,800	248,000	330,000	450,000
Nov. 4	2 hr. after 8 lb.		108,000	300,000	270,000	540,000
Nov. 9	2 hr. after 8 lb.		115,000	960,000	930,000	910,000
Nov. 11	2 hr. after 6 lb.		54,000	3,000,000	1,980,000	2,770,000
Nov. 16	2 hr. after 6 lb.		104,000	780,000	430,000	520,000
Nov. 18	2 hr. after 10 lb.		21,400	1,890,000	950,000	870,000
Nov. 20	2 hr. after 10 lb.		276,000	194,000	287,000	390,000
Nov. 23	2 hr. after 10 lb.		26,000	950,000	236,000	820,000
Nov. 25	2 hr. after 10 lb.		109,000	353,000	520,000	510,000
Nov. 26 (a)	1.5 hr. after 1st 10 lb.		5,000	155,000	78,000	142,000
(b)	1.75 hr. after 2nd 10 lb.		4,000	32,000	90,000	68,000
(c)	3 hr. after 3rd 10 lb.		30,000	480,000	520,000	276,000
Nov. 27	2.25 hr. after 10 lb.		53,000	330,000	980,000	1,140,000
Nov. 30	1.75 hr. after 10 lb.		73,000	650,000	540,000	550,000
Dec. 2 (a)	2 hr. after 1st 10 lb.		95,000	1,150,000	670,000	740,000
(b)	1.5 hr. after 2nd 10 lb.		48,000	680,000	340,000	410,000
(c)	3 hr. after 3rd 10 lb.		90,000	470,000	450,000	510,000
Dec. 4	0.25 hr. after 3rd 10 lb.		510,000	1,300,000	1,270,000	1,070,000
Dec. 6 (a)	1.25 hr. after 3rd 10 lb.		930,000	1,930,000	1,800,000	1,870,000
(b)	4.75 hr. after 3rd 10 lb.		1,720,000	2,590,000	1,760,000	2,080,000
Dec. 7	1 hr. after 1st 10 lb.		326,000	1,040,000	860,000	910,000

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Steam Power Plant Auxiliaries

The McGraw-Hill Book Company has recently issued a new second edition of Croft's "Steam Power Plant Auxiliaries and Accessories," revised by D. J. Duffin, formerly of the Consolidated Edison Company of New York. (580 pp. 5½ x 8¼). For years many operating engineers have used this practical manual for guidance in selecting, installing, operating and maintaining their power plant auxiliaries. Included in the 2nd edition which has over 500 illustrations are chapters on pumps, injectors, methods of boiler feeding, feed water heaters, deaerators, evaporators, economizers and air-preheaters, steam condensers, spray ponds, steam piping of power plants, steam separators and traps. An interesting feature of the book is the presentation and solution of a large number of practical mathematical engineering problems.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y. at $5.00 per copy.

Quality Control Meeting

The American Society for Quality Control will meet at the Hotel Sherman, Chicago, Ill. on June 5-6, 1947. Registration and reservations should be made with the Chicago Association of Commerce and Industry, 1 North La Salle St., Chicago, Ill. This will be an open meeting to which those interested will be welcome.

A large number of papers will be presented and clinics held for the discussion of quality control methods and the review of new developments in quality control techniques and methodology. The meeting's purpose is to develop among quality control people a more adequate understanding of the contributions of quality control to industrial efficiency.

A few of the subjects to be discussed are: "Control Chart Principles in Industrial Applications", "Acceptance Sampling by Variables," "Techniques for Research and for Process and Product Development", "Is Your Inspection Department Inspecting?" "Statistics and Time Study" and "Why Statistical Control Gets Results".

Not National Container

The April 24th issue of the PAPER TRADE JOURNAL published the paper given by the writer entitled "The Interstate Commission on the Delaware River Basin", at the February 24th meeting of the Technical Association of the Paper and Pulp Industry.

I have had my attention called to an inadvertent and unintentional error which I made in referring to paper company plants in the Delaware River Basin which were not meeting their responsibility in stream pollution abatement programs. In the seventh paragraph of the section of the paper which carries the heading Stream Pollution Abatement, I include the National Container Corporation as one of the paper companies that was not "doing an honest-to-goodness job in preventing the defilement of the region streams by their waste." The National Container Corporation should not have been included in that reference. In fact, it has no plants in our region. I meant to refer to another company with a similar name.

I exceedingly regret this error and respectfuly request you to publish a notice of correction in one of your early issues of the Journal. I ask this because I feel my error might result in the wrong impression as to the participation of the National Container Corporation in stream pollution programs. It is my understanding that this company is fully doing its part in preventing stream contamination.

Sincerely yours,
JAMES H. ALLEN

TAPPI Notes

Peter A. Paulson consulting engineer, has movd from Long Beach to Encinitas, California.

E. Clinton Ash, Jr., of the Crown Zellerbach Corporation, has been transferred from Port Townsend, Wash., to the Central Technical Department, Camas, Wash.

L. Vernon Peakes, formerly of the Reynolds Research Corporation, is now chemist for the Nopco Chemical Company, Harrison, N. J.

C. L. Gillespie, formerly packaging engineer for The Cromwell Paper Co., Chicago, Ill., is now Industrial Packaging Consultant, 410 Commonwealth Bldg., Annex, Pittsburgh 22, Pa.

Robert W. Delaney, formerly of A. M. Collins Mfg. Co., Philadelphia, Pa., is now chemist and colorist for the Louis Dejonge Co., 330 Tompkins Ave., Staten Island, N. Y.

Lloyd Lang, formerly of the Forest Products Laboratory, is now development engineer for the Crossett Paper Mills, Crossett, Ark.

Vernon L. Tipka, formerly of the Forest Products Division, C.P.A., is now in the sales department of the Bird Machine Company, 603 Main Street, Evanston, Ill.

Stewart V. Rogers, formerly of the So-Lo Works, Inc., is now with the Osborne Paper Mill Equipment Company, Fulton, N. Y.